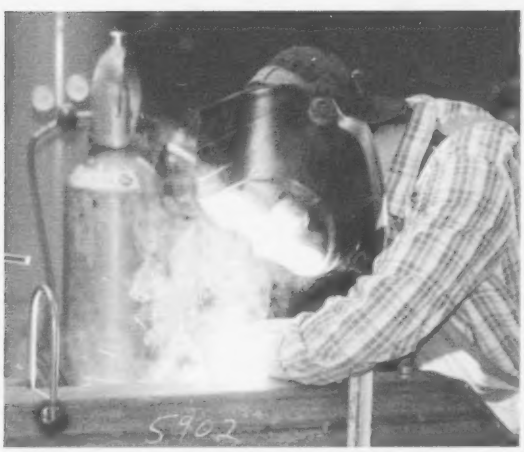
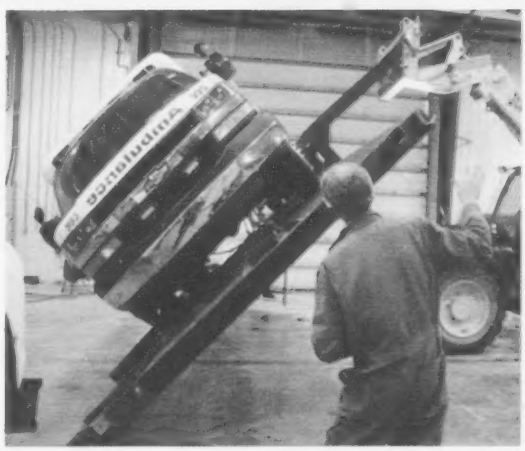
PAMI

Innovative Solutions
for Agriculture and Beyond





2013-14 Annual Report

Agriculture for the next generation

Prairie Agricultural Machinery Institute (PAMI) is:

- an ISO 9001:2008-registered and ISO/IEC 17025:2005-accredited applied research, development, and testing organization serving agriculture and industry in western Canada and beyond
- a farm-technology leader serving the agricultural sector by providing independent, third-party farm equipment evaluation and development, spurring technological advances in all areas of traditional farming practices
- a prairie-rooted organization located in Humboldt and Saskatoon, Saskatchewan, and Portage La Prairie and Winnipeg, Manitoba

PAMI's diversified engineering expertise has direct application for other sectors including transportation, military, aeronautics, forestry, and mining.

PAMI services include design; development; prototyping; evaluation of vehicles, machinery, and components; value-added process reviews; pilot plant design; and optimization.

Year at a Glance

Ag Development

- 55 projects
- $2.0 million value
- $27 million economic impact*
- 74 industry jobs created/ maintained*
- Areas of work include; crop production power units and implements, livestock medicines

** Economic estimates made by PAMI*

Ag Research

- 33 projects
- $1.9 million value
- $37 million economic impact*
- Areas of work include; crop and livestock production equipment and systems, manure management, bio-energy feedstock and utilization systems

Partnerships

- Service on agricultural committees, boards, task forces; exploring new opportunities
- Service to sectors beyond agriculture, creating additional economic impact of $7 million and 19 jobs* in the provinces

WESTEST

- 19 projects
- $0.4 million value
- $5 million economic impact*
- 15 industry jobs created/maintained*
- Areas of work: developmental testing of agricultural, industrial and transportation machinery and vehicles.
- Growth: capital equipment procurements to broaden capabilities

Strategy

- Reviewed/renewed strategic plan for 2014/15 and beyond
- Key focus to diversify our client base, and target new, high-value clients
- Scale and "lean" PAMI to align with its business environment
- Explore options for the best long term home for WBDC
- Sustain PAMI's knowledge core through succession planning

Information Services

- Outreach and information/knowledge transfer through legislator receptions, conventions, tradeshows, field days, news conferences, knowledge systems, website development

Learning and Growth

- 20% down-scaling to align with markets
- Levered capital equipment procurement to sustain future service opportunities
- Focused organizational development; training and planning

PAMI

Innovative Solutions
for Agriculture and Beyond

Prairie Agricultural Machinery Institute

Annual Report 2013-14

Table of Contents

Letters of Submittal		2
Chairman's Message		4
President's Message		5
Strategic Direction		6
PAMI Highlights:		
	Introduction	7
	Outreach	8
	WESTEST	11
	Crop Technology Development	14
	Bioenergy and Products	19
	Western Beef Development Centre	26
	New Equipment Purchases	35
	Industry and Mining	36
	Our Projects	40
	Our People	41
Management Report		43
Auditor's Report		44
Financial Statements		45
Notes to Financial Statements		50
Schedules		57

Letters of Submittal

Honourable Lyle Stewart
Minister of Agriculture
Government
of Saskatchewan

Honourable Ron Kostyshyn
Minister of Agriculture, Food
and Rural Development
Government of Manitoba

PAMI

Innovative Solutions
for Agriculture and Beyond

Humboldt, Saskatchewan
June 28, 2014

The Honourable Lyle Stewart
Minister of Agriculture
Government of Saskatchewan

The Honourable Ron Kostyshyn
Minister of Agriculture, Food and Rural Development
Government of Manitoba

It is my honour to present the annual report of the Prairie Agricultural Machinery Institute for the year ended March 31, 2014.

Respectfully submitted,

Tim Oleksyn
Board of Directors Chair
Prairie Agricultural Machinery Institute

Saskatchewan
Ministry of
Agriculture

June 28, 2014

The Honourable Vaughn Solomon Schofield, S.O.M., S.V.M.
Lieutenant Governor,
Province of Saskatchewan

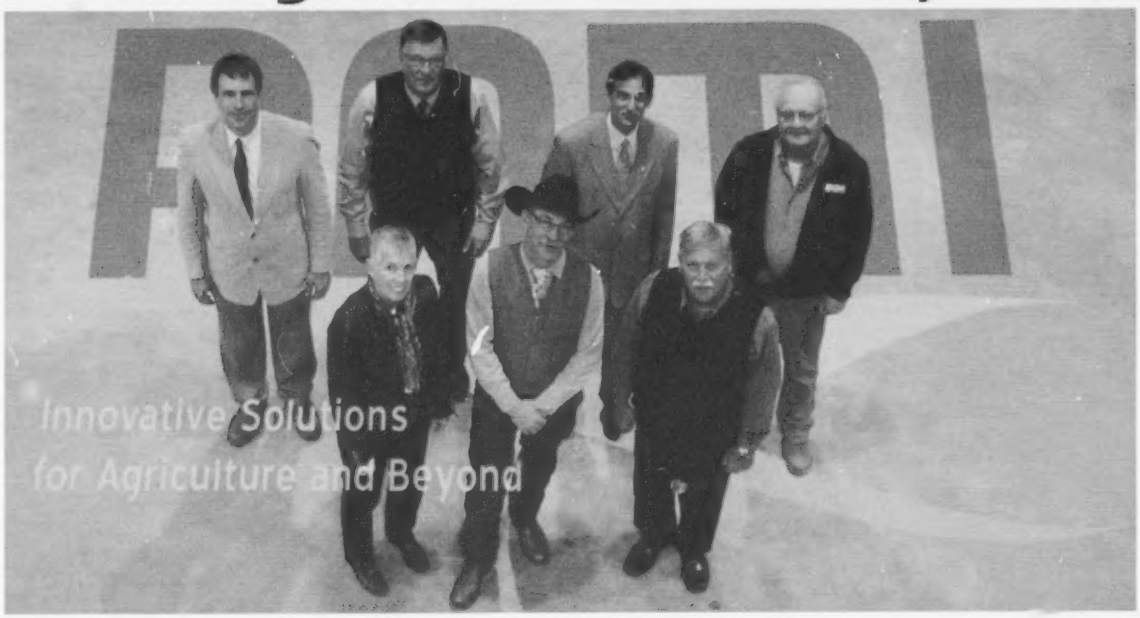
Your Honour:

I have the honour to submit the annual report of the Prairie Agricultural Machinery Institute for the year ended March 31, 2014. It includes the financial statements audited by the Provincial Auditor.

Respectfully submitted,

Lyle Stewart
Minister of Agriculture
Government of Saskatchewan

Prairie Agricultural Machinery Institute



Board of Directors

Back row (from left):

- *Boris Michaleski, Manitoba Producer;*
- *Bryan Hadland, Saskatchewan Producer;*
- *Dr. Abdul Jalil, Representative of the Saskatchewan Ministry of Agriculture;*
- *Bill Zettler, Vice-Chair, Manitoba Producer*

Front row (from left)

- *Dr. Tracy Gilson, Representative of Manitoba Agriculture, Food and Rural Development;*
- *Tim Oleksyn, Chair, Saskatchewan Producer;*
- *Jerry Engel, Representative of Agricultural Manufacturers of Canada;*

Corporate Management Team

- *David Gullacher, President/Chief Executive Officer*
- *Joanne Forer, Vice President, Finance and Administration*
- *Harvey Chorney, Vice President, Manitoba Operations*
- *Dr. Paul Jefferson, Vice President, Western Beef Development Centre*
- *James Wassermann, Vice President, Saskatchewan Operations*

PAMI

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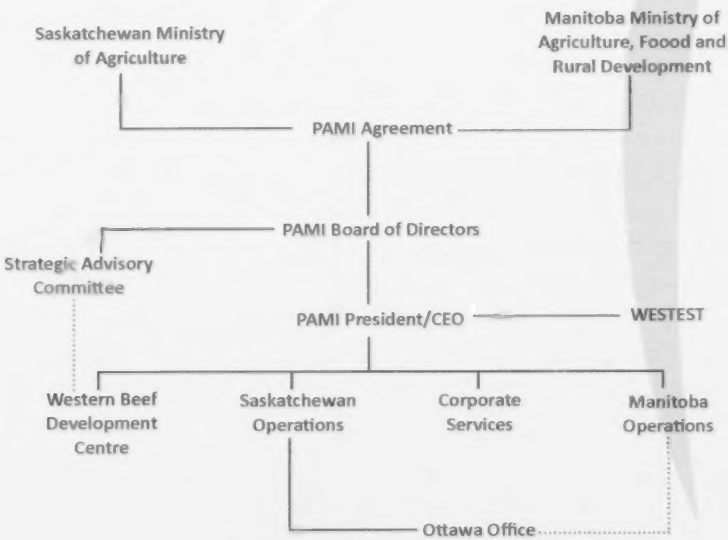
for Agriculture and Beyond



Chairman's Message

Tim Oleksyn

Just as the agricultural industry has seen advances in innovation and practices, so have we at PAMI. Our beginnings are humble, yet the work we completed was invaluable to the farmers who received the results. We began by evaluating and reviewing farm equipment, distributing comprehensive reports to farmers who needed the information to make informed purchasing decisions. Our influence in this sphere garnered the attention of equipment manufacturers who recognized the value in investing in research and development.

This evolved into projects in a number of diverse industries like mining, while still growing our agricultural research capacity to leverage our expertise to find solutions and develop best practices for farmers and ranchers. At the same time, we were working to develop new ways of harnessing and utilizing renewable energy.

In good research, one solution should beg two more questions, and the research we have done has always led us not only to expanded knowledge, but also to more inquiries and, as a result, more project work.

Each new area we explore expands our capabilities and our knowledge alike. In 2013-14, we celebrated this continued growth and progression. This annual report provides a sampling of the work that has been successfully completed this year, fulfilling our vision of "Providing Innovative Solutions for Agriculture and Beyond."

Our successful growth and the aforementioned progress can be attributed to the diverse skill sets possessed by our talented staff, our corporate management team, and our Board of Directors. While we all come from different places and bring different experience to the table, we are all working towards the same goal – the continued progress and success of PAMI and the valuable insights we provide to our audiences.

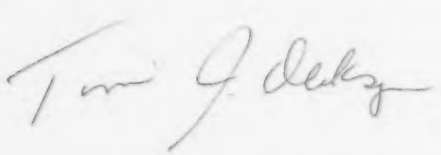
As the agricultural industry evolves, we at PAMI utilize our diverse skills to adapt quickly and address the environmental changes affecting our industry. Drawing on our collective expertise, contacts and wisdom, we are always looking to the future to determine in which direction we will need to move in order to be there first.

I am very grateful to the PAMI Board of Directors, for the wealth of wisdom, experience, and character they bring to the governance of the organization. This diverse group of extremely committed people provides a strong backbone to our organization and I appreciate their dedication to bringing our vision to life, guiding it well.

Thank you also to the WESTEST Board of Directors for guiding the operations of this highly specialized testing organization with which we are proud to be associated. The Strategic Advisory Committee of the Western Beef Development Centre also deserve our applause for their guidance over the past year. Both of these boards have worked hard, demonstrating dedication to the important causes they represent.

In closing, I thank the Governments of Saskatchewan and Manitoba for their support of PAMI and recognize the Honourable Lyle Stewart and the Honourable Ron Kostyshyn, the two Ministers of Agriculture for Saskatchewan and Manitoba respectively, for this bi-provincial collaboration. I thank them for the loyalty they have shown to this organization, and the trust they place in us, the Board of Directors, to guide it.

We look forward to many more years providing innovative solutions to the agricultural industry and beyond.



President's Message

David Gullacher

Agriculture for the next generation.

As we reflect on the year now past, we are struck by the leaps that agriculture is making in the Canadian Prairies.

At our field days and other agricultural events, we find ourselves interacting with increasing numbers of young agricultural entrepreneurs. The tools they will need in this rapidly transforming industry are challenging us to grow in new directions, so we can be there to help.

PAMI is committed and bound to its clients. Although we get core funding from our two provinces, we need to source 80 to 90% of our funding from the associations, firms, and individuals we serve. Their technical challenges become our challenges, and their business challenges become ours also.

This past year brought challenges to a few of the sectors we serve. More specifically, we saw a 17% reduction in project numbers and a significant reduction in revenue overall. While those challenges required that we scale down our organization by about 20%, what we did not scale back on was quality and diligence in our work. Our clients overall gave us a score of 87%, which is nearly identical to our score of last year.

We said earlier that agriculture and the other industries in our provinces are pushing forward and they need new technologies to do so. We were given an opportunity this year to significantly broaden our own set of technology tools in order to partner with them. Two separate funding initiatives provided us and our associate WESTEST with capital equipment and facilities. These new tools have everything to do with the technologies that will soon transform many of our current practices. Precision agriculture, terra-mechanics, mechatronics, and extreme environment simulation are arenas that we are now well equipped to work in, as innovations from various sectors cross over, blend, and find new levels of synergy.

I'd like to thank our provinces, Saskatchewan and Manitoba, and our Ministries of Agriculture for our close partnership in the work of the past year. I thank our Board for their excellent governance and strategic guidance and I thank our staff for the leadership that they as individuals practice in their work and in our organization.

PAMI is a tough, resilient organization. It has a solidly founded purpose; and it has a very bright future, as we serve the needs of agriculture for the next generation.

Strategic Direction

Vision

Innovative solutions for agriculture and beyond.

Mission

To enhance sustainability and profitability in agriculture and other sectors through research, innovation, adaptation, and knowledge transfer.

PAMI's mission, vision, and operating principles outline our roles and provide the foundation for the development of our strategic plan. From this base, in November 2013, the Board reviewed and identified the key strategic focus areas. Our mandate is fulfilled by the expertise and energy of our people who play a key role in achieving the organization's results and sustaining the confidence and partnerships attributed to us by the Provinces of Saskatchewan and Manitoba, our clients, and our Board of Directors.

The Board reviewed marketing plans with strategies in each of our market segments: agriculture research, agriculture development, industry, and military. From this information, the Board identified the threats in our macro environment, the trends driving our market environment, and our objectives.

Long-Term Objectives:

PAMI's five key strategic focus areas are

1. to increase PAMI's profile, public visibility, and communications,
2. to develop new technical initiatives,
3. to increase our financial stability and growth,
4. to develop human resource strategies to increase our flexibility and efficiency, and
5. to ensure PAMI stays competitive in the marketplace while maintaining our core competencies and responsiveness.

Goals for 2014-15

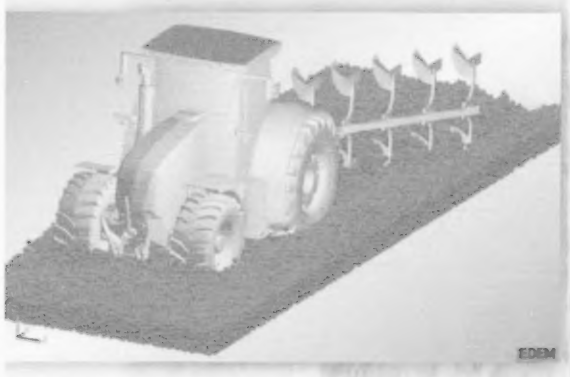
The following are PAMI's highest priority goals for the next year:

- Diversify our client base and target new high-value clients.
- Determine sustainable level of business with client groups that have seen reductions in the past year.
- Scale and "LEAN" PAMI to align with its business environment.
- Explore options for the best long term home for WBDC.
- Sustain and build on PAMI's knowledge core through effective succession planning.

PAMI Highlights 2013-14

PAMI's activities this year spanned a wide spectrum, and that is absolutely natural for this 39-year-old bi-provincial contract research organization. In describing the year, we'd like to begin by discussing our outreach activities; from our interaction and learning from our legislators, to our technology transfer efforts with our clients and the public. We want next to discuss our activities with our associate organization WESTEST, and the significant advancements in capability made this year together with them.

We then will go into significant detail in describing our work relating to crop production technologies, bioenergy and bio-products, and beef and forage production. We will go beyond agriculture to highlight work we did for other sectors in the provinces, nationally and even internationally. We will wrap up with a synopsis of our people and highlights of their accomplishments and awards during the year.



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Outreach

"What is PAMI? What does PAMI do?"

That's a question we hear all the time.

One of the challenges of promoting the work that PAMI does is the variety of abilities our organization possesses. Farmers, for the most part, still associate PAMI with equipment reports, and the public mainly associates PAMI with farm equipment only. Yet there is so much project work happening in other areas, such as defence and security, industry and transportation, it's challenging to get the full scope of the message across.

Full effort was expended in 2013-14 to reach out to our clients and the public to let them know the varied strengths of our complex organization. Videos, tradeshow visits, clinics, our website, conferences, and field days were used to connect with the general public and those who may require our services.

Legislative Receptions

We hosted a reception for Members of the Legislative Assembly in both Saskatchewan and Manitoba in November. We were able to connect with many of the MLAs personally, explaining what we do, why we do it, and how we lever the government investments in our divisions.

PAMI Staff members including CEO David Gullacher (above, left), Gary Niekamp (top, left), and Kathy Larson (at right, centre) chat with members of the Saskatchewan Legislative Assembly about the work that PAMI does to help the prairie provinces.

Above: The Western Beef Development Centre's Bart Lardner is interviewed by a reporter at Agribition in Regina.

Conventions

We manned booths at conventions like CANSEC, Canada's premier defence trade show held in Ottawa, to talk to our defence and security clientele, and at the Agricultural Manufacturers of Canada (AMC) annual convention in Regina, looking to connect with the major manufacturers of farm equipment, with whom we've worked in the past.

PAMI staff spoke to farmers and clients at the Farm Progress Show in Regina, sparking much interest with their "Guess the Canola Loss" competition, and the Western Beef Development Centre, a division of PAMI, was a strong presence at Canadian Western Agribition again this year, answering questions from producers about winter feeding and economics. The PAMI crew was also at the Crop Production Show in Saskatoon in January, hosting a session entitled "Product Development Cycles" that attracted a crowd of people involved with small or medium-sized enterprises.

PAMI staff members man the booth at the Farm Progress Show in Regina in June 2013.

Western Beef Development Centre (WBDC) Field Day

The 15th annual WBDC Summer Field Day, held June 25, was a huge success again in 2013. A full slate of researchers speaking on a wide range of topics under the banner of "Riding Technology into the Future" attracted over 130 producers and industry i: ;iders to the ranch.

Dr. Paul Jefferson addresses the crowd at the 2013 WBDC Summer Field Day.

The keynote address was given by Dr. Colin Palmer (right) of the Western College of Veterinary Medicine, who spoke about raising successful replacement heifers.

Other technical addresses focused on challenges with breeding, dryland grass breeding, painful procedures, and the beef code of practice. Field tours gave information on WBDC research projects such as stockpiled perennial forage grazing, absinthe control in pasture, growing sainfoin, and Radio Frequency Identification (RFID) tag retention.

The WBDC also launched videos last year on their YouTube channel on a number of their projects.

Forages were a hot topic at the WBDC Field Day in 2013. Researchers Dr. Alan Iwaasa (above) spoke about sainfoin for bypass protein and digestive efficiency.

Website

PAMI's website continues to be developed. Work was done to prepare to launch the entire resource library of PAMI reports and materials on the website. That work should be completed in 2014-15. Tools for producers will be a major part of that revamp, including the updated rental guide for farmers, loss calculators, and the entire library of equipment reports. New to the site will be detailed research project reports written by PAMI engineers and agrologists.

News Conferences

PAMI was prominent in the world of media in the past year. Members of the Saskatchewan media were invited to check out PAMI's solid state anaerobic digester at its location at the Termuende Ranch last fall. The event was held to announce new funding for the digester from the Saskatchewan Stock Growers through the Canadian Agricultural Adaption Program (CAAP). Representatives from weekly newspapers, radio stations, and television stations attended the news conference.

PAMI president and CEO Dave Gullacher shows off a bag of manure post-digestion at a media conference held at the Solid State Anaerobic Digester (below) in September 2013. The digestate is virtually odour-free.

Speakers included Dr. Joy Agnew of PAMI, and Brad Wildeman, president of Poundmaker Ag Ventures, one of the partners in the digester project. The project captured the interest of the media, prompting several stories about the digester and its possibilities for green energy production and putting agricultural waste to good use

WESTEST

Board of Directors

Jerry Engel (chair), Agricultural Manufacturers of Canada (AMC)

Rhonda Orr, Manitoba Hydro

Pamela Schwann, Sask. Mining Association

Mark Chaney, John Deere

Don Watt, CNH Global

Damir Gospic, AMC

Ray Malinowski, AMC

Russ Klassen, AMC

Geof Gray, AMC

WESTEST is an industrial testing and engineering facility with over two decades of proven, industry-respected service, delivering advanced product engineering and development. Its offerings are integrated with a wide array of physical testing capabilities to equipment and vehicle manufacturers across North America. WESTEST designs and evaluates components, full vehicles, and machines for a broad range of equipment and manufacturing industries.

WESTEST's ability to physically evaluate designs under simulated conditions that accelerate normal operation allows clients to quickly and effectively develop durable products with less uncertainty regarding their performance in service. This provides them with a substantial competitive advantage through rapid roll-out of new products.

Dignitaries on hand for the funding announcement from WD included (from left) Eric von Doellen of Staging Canadell in Humboldt, a Westest/PAMI client; Jim Henry of CNH, also a Westest/PAMI client; Jim Wassermann, vice-president of PAMI's Saskatchewan Operations; Minister Michelle Rempel; Troy Lucyshyn, Program Manager with PAMI/Westest; Brad Trost, Member of Parliament for Saskatoon-Humboldt.

In April, Hon. Michelle Rempel, Minister of State - Western Economic Diversification Canada (WD), announced that WESTEST would receive a $2.5 million grant from WD to modernize equipment at the Saskatchewan facility, and improve the organization's engineering and development capacity for industrial manufacturers. The upgraded facility will include testing labs and development tools for precision farming, mechatronics, terramechanics, spray technology, and extreme temperature experiments.

Some of the equipment included:

- A new electro-magnetic shaker table (at right) to complement existing equipment. It can be used in the organization's environmental chamber, and can shake at a much higher frequency than the organization's existing hydraulic shakers.

- A thermal imaging camera (at left), that can help identify problems during testing of products, especially in the environmental chamber. It provides clients with enhanced information about heat loss, insulation and component failures.

- A larger centre of gravity tilt table, which allows much larger vehicles to be tested, including wheeled loaders, semis, motorhomes, defence equipment, and larger tractors.
- A SOMAT Data Acquisition System, which enhances WESTEST's capabilities of acquiring data for problem detection and solving, and durability and reliability testing of new products for clients.
- A premium air seeder, sprayer, and combine harvester, allowing precision agriculture-related research and development projects.
- Upgraded combine test equipment. This will allow research projects that deal with new harvesting and processing technologies, settings and crops.
- A spray pattern laser will allow us to analyze spray droplets and open up research projects into the efficacy of spray coverage and improve application techniques.
- New equipment for creating prototypes for clients.
- Air chiller system upgrades to increase and sustain our cold temperature chamber, to study the effect of low temperatures over a longer period of time.
- A large soil bin to better research seeding and tillage soil tool designs and performance.
- New computer modeling tools, which will allow modeling of particles such as soils, rocks, grains, biomass and powders, as well as the flow of fluids like air, water or oil.

CD-adapco's STAR-CCM+ is used to study the chopping and spreading mechanism of a combine in an analysis that couples particles and air flows.

The increased testing capabilities at WESTEST will complement the capital investments that individual manufacturers are making in their own research and development projects. WESTEST conducts neutral, third-party tests to assess prototypes and improve products or processes. As an International Standards Organization (ISO) registered organization, WESTEST provides manufacturers with testing services which are not otherwise commercially available, or economically feasible, for manufacturers to own.

WESTEST believes that through the modernization of its equipment, it will enable its clients to generate $10 million in sales of newly commercialized products within three years.

Vehicle Performance Centre

In addition to the new offerings in Saskatchewan, the Manitoba arm of WESTEST operated in its existing facilities with clients in 2013-14.

The Vehicle Performance Centre, located at WESTEST's Manitoba location, consists of a dedicated temperature controlled building large enough to accommodate a 45-foot vehicle and contains a chassis dynamometer, an engine test stand, and 100,000 cubic ft./min. air exchange. It is a unique facility which offers full load testing and other services which allow WESTEST clients to accelerate their product development cycle and improve their competitive advantage.

WESTEST facilities also include a hydraulic power unit, MTS Flextest System, and a Multi-Axial Simulation Table (MAST), all capable of force and vibration simulation testing to provide a dynamic durability test service.

WESTEST and its associate PAMI, also offer Roll Over Protection Structure (ROPS) testing, Falling Object Protection Structure (FOPS) testing, gearbox testing, tilt testing, noise and vibration testing, package testing, strain gaging, extreme testing and evaluation, large engine cold starting tests, and container testing.

Staff are trained in the latest 3-D design and modeling software and can provide Finite Element Analysis. They are experienced in standards testing, whether to a known standard or the client's self-imposed standard, and can test equipment and machinery to most known standards.

Crop Technology Development

Ag Machinery Development

Agricultural machinery development – especially the improvement of combine harvesters – remained a cornerstone of PAMI's activities in 2013-14. Over the last 12 months, PAMI's team designed, built, and tested combine test equipment for manufacturers across North America and Europe.

PAMI strives to be the go-to place for combine harvester test equipment. Nearly all major farm equipment manufacturers have utilized our services, and we will continue to develop this line of business in the future.

Producing field-scale test equipment demands considerable time and effort from many PAMI employees, including engineers who create the design, and the skilled journeymen tradespeople and technicians who transform the designs into a functioning machine. Producing a set of combine test equipment requires thousands of hours devoted to mechanical, hydraulic, electronic, and programming design, as well as prototype fabrication.

PAMI not only designs and builds combine test equipment, but also takes it to the field to verify its performance. Over the last year, PAMI employees have travelled to many countries to ensure that these test machines ran smoothly in their operating environment, and to ensure the owners maximized their investment.

PAMI also used our own test equipment in Western Canada for fee-for-service work for manufacturers. The test results were, of course, shared only with the client, but will definitely affect farmers by ensuring that equipment they purchase is being developed to suit conditions in this part of the world.

Tractor field testing was a major part of agricultural machinery development work in 2013-14. The team at PAMI worked with manufacturers to provide benchmarking activities, so that manufacturers could understand the performance and capabilities of their tractors under field conditions.

PAMI levered its field and tractor test experience in testing pulled implements and applied it to developing a test method for this project, which opened new doors for expanded services.

PAMI also worked with several suppliers and manufacturers to ensure performance compatibility between seeding equipment and the products they deliver.

In the future, our agricultural machinery development team at PAMI will continue designing and building test equipment, provide field test services, and conduct lab tests for agricultural machinery manufacturers.

PAMI is looking forward to expanding our capabilities in the spray technology area, which will involve research in the areas of nozzle efficacy, spray efficacy, drift, and sprayer boom aerodynamics.

PAMI is exploring whether an agricultural machinery public evaluation program needs to be recreated and how it might be funded. As well, estimating combine harvester grain loss continues to be a priority. PAMI believes that helping producers and combine operators quantify combine loss and make informed adjustment and operating decisions has the potential to significantly increase grain production in Western Canada.

Through field and laboratory testing, PAMI will contribute to the evolution of farm equipment that is second-to-none in the world.

Applied Agricultural Services

PAMI's applied agriculture services team was working at maximum capacity this past year, providing clients with real-world test results and feedback about their products and machinery-product interactions.

We were able to complete over 10 applied agriculture projects for clients, many of them surrounding product handling testing.

During the growing season, PAMI's teams were in the field, assessing both equipment and agronomic inputs.

Opener testing and replicated plot trials investigating fertility treatments and products are just two examples of services provided. When temperatures dropped and snow started falling, testing moved indoors. PAMI's large indoor facilities and environmental chambers were put to use to simulate field operations for large, field-scale equipment. Testing of product flow, metering, handling and conveyance in farm machinery that included full-size air seeding equipment, was performed.

The indoor tests focused mainly on product behavior in pneumatic distribution systems. Screening, size segregation, and material size distribution analysis were also provided to our clients.

PAMI staff tested material handling equipment, providing data on how it performed under different environmental conditions. Accelerated durability testing was also conducted to simulate a lifetime of wear and tear on a product in a short period of time.

PAMI's value to our clients is that we are able to provide real-life, field research services. In addition, our staff's familiarity and experience with farm equipment enables them to accurately gauge and understand the interaction between product and machinery. Our large, well-equipped facilities also allow testing under controlled conditions, no matter the season. For example, last winter a client took advantage of our laboratory to test a new-to-market product in conditions that might be encountered in the spring when using full-scale machinery. The client recognized the value of getting a jump on what might happen, thus preventing surprises and possible negative customer experiences in the crunch season.

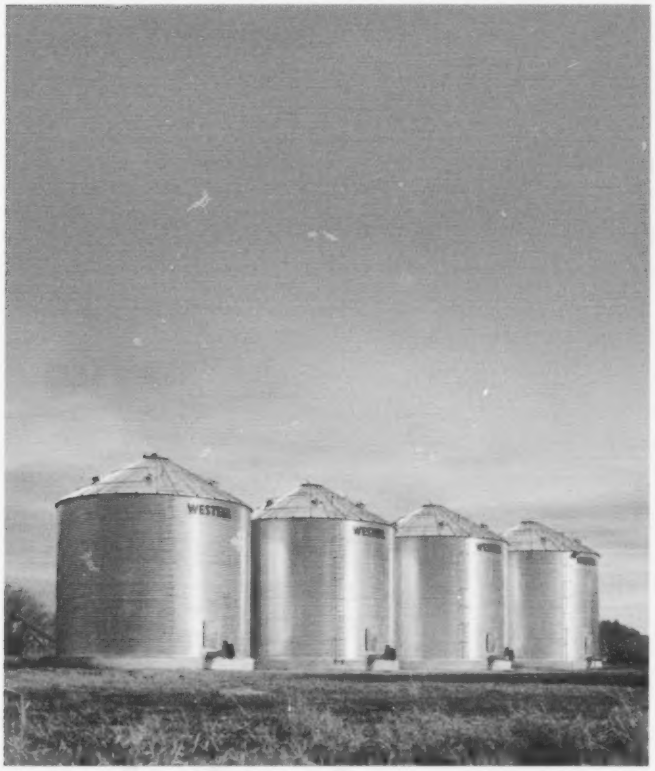
Grain Storage

How to properly store grain is a subject that has increased in importance in the past year. With last year's bumper crop still sitting in many bins around the country, producers are demanding information on how to ensure spoilage doesn't occur over the summer months. PAMI has remained a go-to resource for those looking for information, due to the knowledge we have gained about grain behavior over the past four decades.

In the last few years, PAMI has continued to research grain storage, aeration, and natural air drying (NAD), under funding from the Saskatchewan Ministry of Agriculture. Our research team also recently embarked on a project studying canola storage over the summer months, funded by the Canola Council of Canada.

PAMI conducted a technological and economic assessment of grain storage including the relationship between air and moisture in grain. This work, funded by Manitoba's Keystone Agricultural Producers (KAP) Association, resulted in the creation of a guide on the basics of aeration and natural air drying. The entire report on the project can be found on the KAP website at www. kap.mb.ca.

Another grain storage research project conducted last year focused on the types, sizes, and numbers of bins sold in Western Canada. This work was done in support of a new product designed to monitor in-bin moisture content. What they found was the average bin size was between 5,000 and 10,000 bushels, as bins of this size can be transported easily on roads and highways. What also became clear was that most bin purchases are done at the last minute, and so farmers choose bins that are most readily available and easily installed on their property.



Fibre Harvesting

PAMI has been working with Manitoba Agriculture, Food and Rural Development to develop a better way to harvest linen flax. This flax is a variety which is typically taller and has a higher fibre content than other varieties.

The flax puller PAMI brought in from France in 2012 doesn't cut the flax, as is done with traditional harvest methods. Instead, it pulls the straw out of the ground and lays it in rows, where it is picked up by another machine. The fact that the flax plant is pulled out preserves the entire fibre length, which is necessary for processing.

In the past year, PAMI acquired additional specialized equipment for this project – a flax turner and a fibre bundler, also from France. Purchased through the Composites Innovation Centre with funding through Growing Forward 2, this equipment allows researchers to replicate and study methods for the harvesting of fibre crops in Europe in order to adapt them to the conditions found in Manitoba.

Field trials with the new equipment will first be conducted in the summer of 2014. A final report should be issued within the coming year.

Manure Research

PAMI moved ahead with field testing for its evaluation of treatments of manure waste and phosphorus in 2013-14. The primary focus of this project is to evaluate treatments that will help producers with intensive livestock operations, especially those in south-eastern Manitoba, comply with new legislation surrounding manure waste and phosphorus treatment which came into effect in Manitoba in November 2013.

The new legislation is due in part to concerns that nutrient-loading into Lake Winnipeg may be producing algae blooms.

Our work in manure treatment focuses on separating the liquid manure from the solid manure in order to decrease the concentration of phosphorus in the liquid, as excess phosphorus is one of the main causes of algae blooms. The separation is necessary to enable liquid manure to be applied to fields at a higher rate without exceeding the limits of phosphorus per acre.

PAMI has focused on two systems in our research – a centrifuge and a rotary press. Two years ago, staff installed and operated the systems at a commercial barn, where we evaluated its effectiveness, economics, and overall suitability for placement on Manitoba farms. Manure underwent an analysis before and after the treatment to study the effects on nutrient composition.

We then continued our study of the centrifuge, evaluating it during winter, as the technology had not been proven in Manitoba's severe climatic conditions. We also focused on quantifying the effect of a flocculant on phosphorus removal, and evaluated a fine mesh filter system, which uses a different method of separating solid and liquid manure. In addition, we looked at the financial and technical feasibility of this system on the farm.

The end goal of these projects is to provide Manitoba farmers with verified performance and economic information on manure treatment technology to help them decide if it is economically feasible for their operations.

With the field work now complete, a final report on manure separation technology will be forthcoming.

The project was funded by the Manitoba Livestock Manure Management Initiative.

Bioenergy and Products

Solid-State Anaerobic Digester

PAMI research into solid state anaerobic digestion (SSAD) moved ahead in 2013-14 as trials were run with solid materials such as cattle manure and cull potatoes.

PAMI's SSAD converts agricultural residue and waste into energy through digestion, a natural microbial conversion process. The digester provides the proper climate for breakdown, and collects the gases emitted, which can be converted to energy like electricity or heat. The leftover digestate — which is extremely rich in nutrients yet virtually odour-free — is unloaded after digestion and can be field-applied.

What's unique about the PAMI digester is that it processes solid biomass material, and most other digesters use liquid material. The goal of PAMI's SSAD program is to determine the most practical and efficient way to digest solid biomass.

Last year, SSAD research moved forward through four trials run over the spring and summer months. What they found throughout these trials was as follows:

Cull potatoes from True North Seed Potatoes were added to manure from Poundmaker AgVentures and loaded into the solid state anaerobic digester last fall.

- Using solid digestate as inoculum material generates more biogas earlier in the digestion period than using liquid leachate as inoculum.
- If no liquid is added to the raw feedstock, some leachate is produced during the digestion process. And while gas production from "dry" digestion is approximately 25 per cent lower than from "wet" digestion, material handling is simplified with "dry" digestion.
- Adding cull potatoes to manure as a digestate produces no more gas than manure alone; however, the end product after digestion was a nutrient rich, humus-like material that was relatively odour free, indicating that this is an excellent way to dispose of cull potatoes.

In the upcoming year, researchers plan to experiment with digestion of deadstock and possibly cattails and spoiled carinata meal (leftovers from the process of creating biojet fuel).

The bench scale digester continued to run in the past year, based at the University of Saskatchewan. What they have learned through their trials is that the source of manure can have an effect on its digestability. Fresh manure from the University of Saskatchewan farm did not digest as well as the manure taken from a commercial feedlot. This year, the bench scale research team will evaluate the effect of compaction on digestion, and will experiment with cattails, temperature fluctuations, and possibly a new source of solid material, like food waste.

At the end of the trial, little to no trace of cull potatoes was evident in the digestate left behind.

As part of recent SSAD research, the team partnered with the Saskatchewan Stock Growers Association to examine digestion as an alternative management method for solid manure. The purpose was to determine if this method of dealing with manure might be viable for cattle producers by examining the financial viability and the advantages of alleviating certain negative side-effects of traditional manure handling methods.

Using an environmental scoring system they devised, PAMI researchers assigned dollar values to certain environmental factors and determined costs of the digestion system. They found that SSAD if all the benefits of digestion are taken into account – biogas production, social perception, and carbon footprint, as well as the high nutrient value of the digestate — anaerobic digestion makes sense for most operations that are generating organic waste.

In the past year, the lids for the SSAD reactors were redesigned, as they previously required four or five people to install. Since the reactor-style digester could be useful to some end users at the end of the study, it was decided to design an automatic lid on one of the pilot reactors. The lid uses hydraulic cylinders to open and close the lid, making it possible for one person to load and unload the reactor. The new lid was constructed over the winter, and will be put to use in this summer's trials.

A new hydraulically powered lid was designed for the reactor over the winter, which will allow just one person to load and unload the reactor.

A variety of agencies have funded the SSAD and the research associated with it. Last year, the Saskatchewan Ministry of Agriculture provided funding, as did the Saskatchewan Stock Growers' Association through the Canadian Agriculture Adaptation Program(CAAP). Funds also came from the Applied Bioenergy Centre, and the International Institute of Sustainable Development. In previous years, Natural Resources Canada and Western Economic Diversification provided monies.

The SSAD also received in-kind support from the Western Beef Development Centre, Poundmaker Agventures, and True North Seed Potatoes.

Liquid Anaerobic Digestion

In addition to solid-state anaerobic digestion, PAMI also conducted research into liquid anaerobic digestion.

In the past decade, the number of liquid anaerobic digestion installations has increased across North America and Europe as a way of recycling bio-wastes while capturing energy from the process. So far, the technology has not been successfully adopted in Manitoba, due to environmental challenges and regulatory requirements.

An anaerobic digester was installed on the Sweetridge farm near Winkler, as part of Manitoba Hydro's Bioenergy Optimization Program. PAMI was contracted to monitor the digester once it is operational. The system is designed to produce between 50 and 72 kW of electricity from substrate and the manure produced by approximately 230 milk cows in the farm's dairy.

The project is not only determining if digestion can provide some of the farm's power, but if the material put through the digester can be reused as bedding in their barns.

Manitoba Agriculture, Food and Rural Development has provided funding to assess the quality of the digestate as bedding and fertilizer materials, and to determine the implications of starting the digester in winter conditions. Start-up in winter poses several challenges, researchers found. The digestate liquid must be heated to operating temperature before the system can begin to run off its own gas production. The separation equipment requires protection from Manitoba's winter climate. Several other issues were encountered delaying completion of various systems.

While analyses between the digestate liquid and barn manure cannot be closely compared as the digestate was derived in part from the lagoon effluent, researchers did observe that there was a significant reduction in fecal coliform bacteria after digestion.

The PAMI research team took nutrient samples of manure in and out of the digester, and plans to do more in the 2014-15 fiscal year.

Cattail Harvesting

PAMI is assisting the International Institute for Sustainable Development (IISD) in their investigation of the cattail as a watershed nutrient management tool, and as a bioenergy feedstock.

Key to using cattails in this manner is the ability to effectively and consistently harvest cattail stands. PAMI was called on to help research cattail harvesting techniques.

The research focused on optimizing methods and techniques for cutting and baling cattails at Pelly's Lake, a natural wetland area with controlled drainage. Cattails were cut while still green using a MacDon rotary disc mower typically used for cutting forage crops. The mower effectively cut the heavy stand without issue, and cattails dried down significantly faster because of the conditioning rolls crimping the cattail leaves.

The cut of the cattails this past year produced a superior windrow compared to the straight cutting that had been attempted previously. The windrow allowed a large square baler to be used. Researchers plan to continue to use a rotary disc mower with conditioning rolls to cut cattails where conditions permit.

Excess phosphorus is the main driver of algae blooms in lakes and may be captured in cattails if appropriate growing and harvesting techniques can be employed. Additional research into nutrient availability and timing of cut is required to determine an optimum time for harvest if phosphorus removal is the primary goal.

Cubing and Densification

Bulk has been a large obstacle when considering the viability of using agricultural biomass as an energy source, even though it otherwise would be ideal due to its low moisture content, potential for lower processing requirements, available expertise in collection and storage, and its carbon dioxide neutrality.

To address the bulk issue, PAMI has built and tested a mobile densification system. This system cubes biomass to increase the mass-to-volume ratio, in hopes of reducing transportation costs. There is interest from producers in densification systems for either their own use, or as a commercial opportunity.

This past year, funds from the governments of Manitoba and Canada through the Growing Forward 2 Growing Innovation On-Farm Program were used to optimize the cubing system, which is housed at PAMI's Manitoba station. Once the upgrades were complete, the system was used to cube biomass, and researchers were able to prove that the cuber now is capable of on-farm applications. Greater access to demonstrations and on-farm research will provide producers with the information they need to make decisions about investing in densification equipment.

Natural Resources Canada also funded a project involving the cuber this year. The organization was looking at cubing waste material from forestry plants. The project involved a test of densifying "hog fuel", a mixture of forest residue and recycled wood for commercial and industrial heating applications.

Results of the testing are still being analyzed by researchers.

Biomass Plot Trials

Biomass crops – those grown as dedicated energy sources – are meant to be low input and low cost in order to make them attractive to grow.

In keeping with that idea, PAMI conducted biomass plot trials at two sites in the last year, one near Prince Albert, and the other near Swift Current. The trials involved crop varieties that should do well in the Saskatchewan climate. The purpose was to determine how little herbicide and fertilizer could be applied while still achieving a good yield.

The three crops grown were sorghum, northern wheatgrass, and smooth bromegrass. A small demonstration plot of miscanthus was also grown at the Prince Albert site.

While the crops failed to establish in the drought-ridden Swift Current area, they did extremely well in the northern parkland near Prince Albert. The yields were impressive, even with the perennial grasses, which included bromegrass and wheatgrass. The break-even yield for a biomass crop is estimated to be 10 dry tonnes per hectare. The sorghum plots produced double that, and the perennial crops were nearly at that level as well, and are expected to be higher next year.

Funding for this project was supplied by the Applied Bioenergy Centre, in collaboration with Saskatchewan's Agri-ARM program.

Torrefaction and Biochar Handling

The process of torrefaction involves heating biomass in the absence of oxygen so that the thermochemical conversion creates char instead of ash. It's not burning, but roasting, and its primary byproduct is torrefied biomass, which behaves like coal, can be pelletized, and is easy to crush. Barbecue briquettes are a product of torrefaction.

PAMI assisted the University of Saskatchewan on a torrefaction project focusing on agricultural residues in the past year. The study, which focuses on optimizing the operating parameters for the process, required a bench-scale torrefaction unit which PAMI helped to design and build.

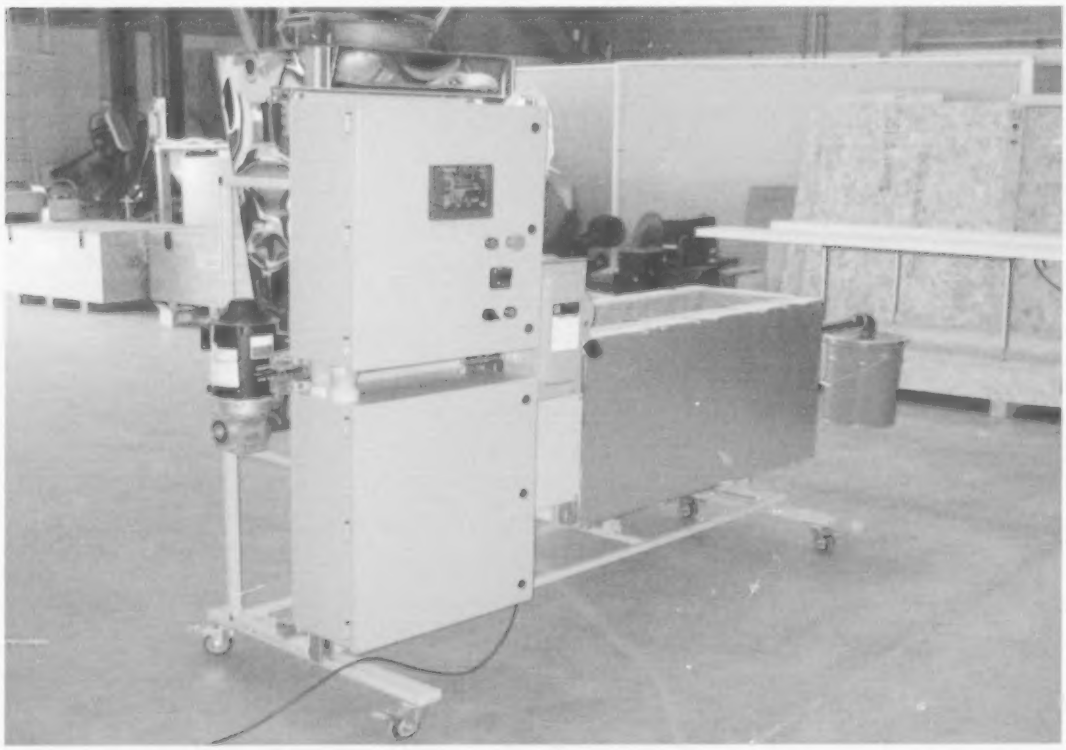
The study was still underway at the time of writing and results are not available.

Biochar, a by-product of the thermo-chemical conversion process called pyrolysis, was the focus of another PAMI project. PAMI evaluated the equipment and material handling requirements for large scale biochar application to soil.

There are documented benefits of adding the powdery biochar to soil , but there has been little research into how to apply it at high rates (20 tonnes per hectare).

PAMI concluded that it may be possible to utilize conventional spreading equipment to land apply biochar, but the biochar must be mixed with either a solid or liquid manure to improve handling characteristics and minimize losses due to blowing. Alternatively, the biochar can be pelleted before application, but densification may negate some of the benefits of biochar application and pelletization would add another processing requirement. More research is required to compare application of powdered and pelleted biochar and evaluate the energy requirements of biochar pelletization.

Funding for this project was supplied by the Applied Bioenergy Centre, with collaboration from Titan Carbon Smart Solutions.



Western Beef Development Centre

www.wbdc.sk.ca

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The Western Beef Development Centre (WBDC) is a leader in collaborative applied research for the beef and forage industries, identifying and communicating opportunities for profitable innovation. Its mission is to collaboratively link lab and land for the competitiveness and sustainability of the cow-calf industry in Saskatchewan.

The Centre is based at Termuende Ranch, which has an expansive land base and facilities, as well as a 300-head cow herd. The staff conduct research, development, and demonstration projects in partnerships with the research community, industry and government.

The top priorities of the Centre have been identified as grazing management and forage agronomy, technology transfer enhancement with new communications tools, economic analysis, and application and extension of forage-feeding systems and byproduct feeds for beef cattle.

Research was conducted in all of these priority areas this year, from forages to corn grazing to extensive winter feeding systems to new tracking technology for cattle.

Short Rotation Forage Legumes

You don't need to fertilize after you've planted a forage legume crop for hay.

That's the conclusion of the short rotation forage legumes research project conducted over the past four years by the WBDC and partners like the University of Saskatchewan, Wheatland Conservation Area, and Northeast Agricultural Research Farm.

In partnership with PAMI's Saskatchewan Operations, and funded by the Saskatchewan Agriculture Development Fund, the goal of this project was to determine by the yield response of annual crops how much residual nitrogen can be left in the soil from two-year rotations of forage legumes.

At right: Short Rotation Forage Legumes (alfalfa on left; red clover on right) prior to 3rd harvest in September 2011 at Lanigan.

Plots of canola, grown without added fertilizer after short rotation forage legumes, were harvested in 2013.

Small plot trials began at sites in Swift Current, Saskatoon, Melfort, and Lanigan in 2010. Different rotations were tested, some beginning with alfalfa, and others with red clover, barley, and peas. The last two rotations of each were wheat and canola – the former was planted in 2012, and the latter in 2013 – grown without any fertilizer added.

What researchers determined is that the forage legumes leave plenty of nitrogen in the ground for subsequent annual crops to use.

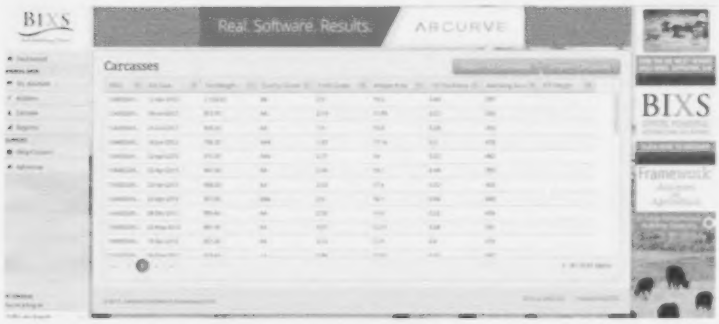
Alfalfa performed nearly as well as red clover in terms of nitrogen replacement in the Parkland region, and it actually did better in the dry Swift Current area, as it is more drought-tolerant. Overall in the drier regions, much less nitrogen was left in the soil than in more moist parts of the province. The drought effect was very clear both in the amount of nitrogen left in the soil, and in the yields of canola, the last crop to be planted in the plots.

While some producers are aware of this effect already, this study proves it, and provides actual numbers that can be used for rotation and fertilizer planning.

The research shows that in the Parkland region of Saskatchewan, a producer could sow alfalfa and harvest hay for two years, and potentially end up with 150 lb of nitrogen for the next two annual crops after that.

The official economics associated with this study should be ready by summer of 2014. This project's findings are good news for producers. It clearly demonstrates that forage legumes can be grown for hay and produce nitrogen for other crops for up to two years after they are removed from rotation. This allows producers to save money they otherwise would have spent on fertilizer.

Beef InfoXchange System (BIXS)



For the past three years, the Western Beef Development Centre has been enrolled in BIXS to evaluate and demonstrate the features of this system, which was developed by the Canadian Cattlemen's Association. Funding for this demonstration project was provided by the Agricultural Demonstration of Practices and Technologies (ADOPT) program.

BIXS is a national voluntary web-based application designed to facilitate cross-segment exchange of data. This data are linked to an individual animal's unique electronic ID tag number, known as the CCIA (Canadian Cattle Identification Agency) tag. The system enables participants to communicate, build business opportunities, and hone marketing programs based on accurate and reliable individual animal and carcass data.

In its evaluation, the WBDC received less information back on their cattle than they expected. For instance, in 2010, they sold 198 calves at weaning, and received carcass data on just 23 of them; in 2011, they sold 187, and received carcass data on 107; in 2012, they sold 221, but received data back on just 13. The information the WBDC did receive back was interesting – it showed the carcass quality of their animals was above average, with prime and AAA gradings that were proportionally higher than the industry average.

The CCA has modified their software and released version 2.0, which is expected to be easier to use, and should improve participation when it comes to data entry. The WBDC will continue to upload its calf crops into BIXS 2.0.

Corn Grazing

The year 2013-14 was the second of a three-year corn grazing project at WBDC.

The two-pronged study is analyzing how cows graze corn and the effect the feed has on their rumen pH levels, as well as how well weaned calves grow when grazing corn to be ready for finishing when they arrive at a feedlot.

In the first year of the study, in response to a concern about the amount of starch found in corn, it was determined that cattle should be limited to three to four days of grazing at a time in order to prevent rumen acidosis. Acidosis, a digestive disorder caused by high levels of starch, can lead to shock and death in severe cases. When limited to an area with three days' ration, the cows fed on the cobs, then the leaves, husks and tassels, and finally the stalk of the plant.

Throughout the second year of the project, the cattle continued to be grazed on corn with no problem of grain overload, as researchers continued to use the limit of three to four days at a time. No evidence of acidosis was detected.

A ruminal pH probe was used on fistulated cows (cows with a stomach port for sampling) for a week at a time, when the cows were exposed to two moves in a field. If there was a drop in pH, which would indicate potential acidosis, the probe would show it in the data it collected. The probe also measured intake. The information from the probes will give the research team more information about managing acidosis, which is the biggest problem producers have when attempting corn grazing.

In the other part of the study, 120 weaned calves were put on corn grazing as a diet, versus barley swath grazing and drylot feeding for 100 days from November to February. They then went to the University of Saskatchewan feedlot, where they were fed to finish, and will go to harvest.

At the end of this process, the research team will have two years of performance data on corn grazing as a background grazing system. They will be able to compare their performance in a feedlot at finish, and will get carcass data as well.

When all the numbers are in, the WBDC will be issuing a report.

Funding support for this project was provided by the Saskatchewan Agriculture Development Fund (ADF) and the Alberta Livestock and Meat Agency (ALMA).

Stockpiled Perennial Forage Grazing

Winter is hard on a lot of things, including producers' pocket books when it comes to feeding cattle. Feeding costs overall represent between 63 and 68 per cent of the cost of keeping a beef cow. Most of those costs are associated with drylot pen feeding over winter, which increases labour and equipment use.

A growing number of producers have adopted winter grazing systems to reduce those costs. One of those systems being investigated by the WBDC is stockpiled perennial forage grazing. Stockpiled forages can be an excellent alternative to expensive pen feeding systems.

The WBDC project involves grazing stockpiled perennial forages in a pasture setting with minimal supplementation to see whether this system can meet the nutrient requirements of mature, dry cows in early to mid-gestation over a Western Canadian winter, and if it can save producers some cost.

The study compares results with cows fed similar baled forage in drylot pens. Cow performance and reproductive efficiency, forage biomass and quality, forage botanical composition, soil nutrients, and system economics were all tracked and examined.

The bottom line of the project is that as the weather gets colder (at the -20 degree Celsius mark) pellet and grain supplementation for protein and energy had to increase for both systems. However, swath grazing is more economical than drylot feeding by about 20 per cent, and has no effect on cow performance or reproductive efficiency. Grazing animals on dormant pasture is potentially a more efficient system in terms of nutrient recycling.

The study is complete, and the findings will soon be released. Funding for this study was provided by the Saskatchewan Agriculture Development Fund.

Cost of Production

The 2012 study of cost of production of Saskatchewan's cow-calf sector was released in the past fiscal year. It revealed that the average cost per cow was $630 (up $5 from the previous year) with an average herd size of 354 cows (up 49 from 2011). The average break-even price for weaned 2012-born calves was $1.42/lb (510 lb average weaning weight).

Larger herd sizes appear to help reduce cost per cow by spreading fixed costs - yardage and overhead - over more animals. The top 25% of producers use extensive field feeding in their winter feeding programs, and they record and monitor their costs. The average herd size for the top 25% of producers was 559 cows, compared to the average of 277 for the remaining 75%. It is important to note that herd size is not everything; it is also important to have sound management practices to ensure productivity remains high. A producer with low costs does not necessarily equate to high profit. Year in and year out, cows must get bred, calves must be born alive and survive until weaning in order to be marketed for revenue which can generate profit.

WBDC's beef economist Kathy Larson is part of a prairie-wide effort to upgrade CowProfit$, the software program used to manage producer data collected between 2001-2012. After its upgrade, producers will be able to use the CowProfit$ software to calculate their whole-ranch cost of production on their own time and at their own pace.

In the interim, a cost of production calculator developed by Larson is available free-of-charge through the WBDC website, along with a sample ranch and tutorial videos on how to use it.

Funding support for these initiatives has been provided by the Agriculture Development Fund (ADF).

Canola Meal as an Energy Supplement

The WBDC collaborated with the University of Saskatchewan on a two-year winter grazing study, examining whether canola meal can be used as an energy source, instead of solely a source of protein. The canola meal was compared to wheat-based dry distillers' grains with solubles, when supplemented at 0.4% body weight to beef cows grazing barley straw-chaff (residue) piles in field paddocks. Supplement effect on cow performance and residue intake was determined. Cows were allocated to one of three supplementation strategies: supplemented 100% canola; 100% distillers' grains; or a 50:50 blend of canola and distillers' grains.

The study found no difference in cow body weight change between the three supplement strategies, however cows supplemented distiller's grain consumed more straw-chaff residue than cows receiving the 50:50 blend of canola-distillers' grains supplement or the 100 per cent canola meal supplement.

The study showed supplementing either canola meal or a canola-distillers' grain blend can provide energy and protein that may enhance the utilization of barley straw-chaff residue.

Funding for this study was provided by the Saskatchewan Agriculture Development Fund.

Grass versus Grain: Economics revisited

For the past year, WBDC's beef economist Kathy Larson has been revisiting the costs and returns of growing grass versus annual crops. A similar project which wrapped up in 2005 showed the economic value skewed to grass. However, Larson's work over the past year indicates that with grain prices rising, that has now flipped.

From 2001-2005, WBDC conducted a case study which compared the costs and returns from two parcels of land – one seeded to perennial forage and the other left in annual cropping. At the time, grain prices were suppressed, so while returns were not high for perennial forage, the costs were lower than annual cropping, which meant the average net returns for the land converted to grass were double that of the adjacent parcel which was annually cropped.

Grain prices began to recover in 2007, but it took until 2011 for weaned calf prices to surpass their 2001 price levels. During this time, the beef cow herd declined over 22%. In 2011, both strong grain prices and strong weaned calf prices existed resulting in a scenario not often seen – profitability in both sectors.

Funding through the Agriculture Development Fund (ADF) and the Alberta Livestock and Meat Agency (ALMA) provided WBDC an opportunity to revisit the economics of annual grain production versus forage production for cow-calf operations at the soil zone level in Alberta and Saskatchewan using 2011 Census data.

The study revealed that annual forage is competitive with cereals, oilseeds and pulses in all soil zones in Saskatchewan except the brown. However, in Alberta annual forage is only competitive in the thin black and gray soil zones. In Alberta there is a larger amount of native pasture than in Saskatchewan which reduces the competition for grain versus grass because land sown to native pasture is assumed to be in its best use.

The yield trend for forages relative to grain crops has not been favorable. The continuation of the flat or declining trend in forage yields could result in a significant shift to crops that have had significant yield gains, namely canola and pulse crops. Even though the number of acres in forage has increased over the past 20 years, much of the increase has been at the expense of area that was summerfallowed. The next 20 years could see increased competition for the marginal cultivated acre from annual grain crops.

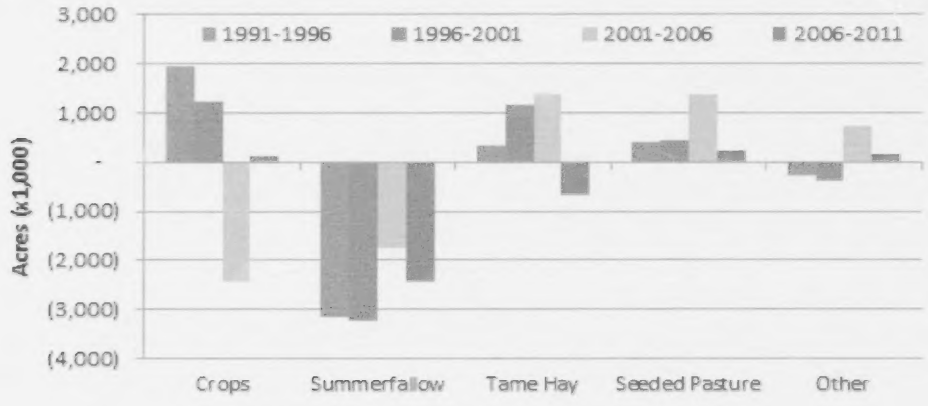


Figure 1: Five year changes in land-use, Saskatchewan, 1991-2011 (Acres)
Source: Census of Agriculture, Table 004-0002

Alternative Heifer Development

A study of heifer development two years after calving has wrapped up. The project was a collaboration between WBDC and the University of Nebraska. It asked the question: will heifers raised to different targeted pre-breeding weights in different systems differ in reproductive efficiency and cost?

The diets of all treatment groups were formulated to meet all nutrient requirements – with heifers fed for a target gain of 1.5 to 2.0 lb per day.

What the study showed was that heifers fed to a moderate weight gain (55% of mature body weight [BW]) performed as well as heifers fed to a high weight gain (62% of mature BW pre-breeding) in first conception rates and rebreeding success. Moderate gain heifers fed using extensive bale grazing saved $60 per heifer compared to drylot pen-raised heifers.

Pregnancy rates were similar for heifers developed to 55% of mature body weight in either bale graze or drylot systems compared with heifers developed to 62% mature body weight, and averaged 88% across systems. The same proportion of heifers in each system were re-bred and followed through to third pregnancy, with no system or targeted body weight effects detected at second calving, for calf birth weight, cow body weight or condition, or re-breeding success. This shows heifers in moderate gain extensive winter feeding systems will gain the same amount of weight as those in high rate of gain systems, they will just do it over a longer period of time.

Results of this study provide evidence that post-weaning development of heifers to achieve moderate gain body weight before breeding in an extensive bale graze system did not negatively affect reproductive performance during first and second calving compared with developing heifers to achieve high gain BW pre-breeding. This suggests that an extensive winter bale grazing system to raise replacement heifers can be a viable alternative to reduce replacement heifer costs.

Funding for this project was provided by the Alberta Livestock and Meat Agency.

For more information,

check out the WBDC website at www.wbdc.sk.ca .

Click on the "Publications and Information" tab for reports and fact sheets

Radio Frequency Identification (RFID) Tags

Radio frequency identification (RFID) tags were mandated by the Canadian Food Inspection Agency in 2002 to help track the movement of cattle from birth until slaughter. In 2010, federal and provincial governments made animal identification by RFID tags mandatory for movement and sale of beef cattle. Through the ability to pinpoint the source and path of animals, the beef industry will be enhanced and protected with the knowledge of which animals are at risk.

However, there is some frustration with the system over some reports of poor tag retention.

For the past two years, PAMI's Saskatchewan Operations has been doing lab-based studies of RFID tag retention to try to find modes of failure and methods of improvement. The project is funded by the Saskatchewan Ministry of Agriculture.

Taking an engineering approach, staff created a simulated ear to study the insertion force and break-apart strengths for each type of tag, and ran them through a series of tests, including varying insertion temperature and ear thickness.

The first year of testing showed that when the correct brand of tool was used to apply the tags, the tags met the tensile strength requirements set out by the Canadian Cattle Identification Agency (CCIA). They also found that inserting the tags in the cold had an effect on tag strength. Tags that were inserted in cold temperatures required a higher insertion force and broke apart more easily. In fact, the insertion force required for application at cold temperatures was higher than the allowable insertion force mandated by the CCIA. It was also noted that the higher the required insertion force, the more likely the tag would be inserted incorrectly. This could lead to poor tag retention.

Testing continued in the past year, as researchers focused on evaluating the strength of a cow's ear, measuring the force required to rip a tag through the cow's ear, as opposed to the force required to rip a tag apart. What they found was that when the tag is subjected to an impact shear force, the tags are more likely to break before ripping through the ear.

However, researchers note that what happens really depends on how a cow snags the tag.

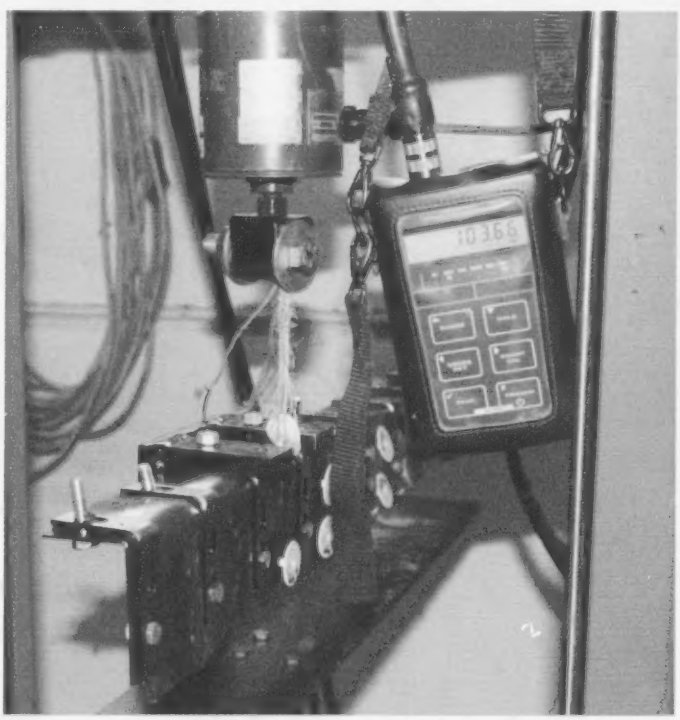
Cold impact testing was also done in the past year. Tags were inserted warm, then tested at -30 degrees Celsius. The result was that on average, all the tags required a higher force to break when impacted in the cold compared to impact tests at room temperature. But researchers also noted that the strength of the tags was much more variable across the brands when they were impacted in the cold. Highly variable tag strengths may contribute to poor tag retention.

The Western Beef Development Centre has also been studying RFID tag retention. WBDC has been working with the CCIA and the Agri-Evironment Services Branch of Agriculture and Agri-Food Canada as part of a multi-provincial project looking at RFID tags, and how ranch management practices impact their retention.

Using their own herd and others in Saskatchewan, WBDC staff installed tags from seven different manufacturers on 140 cows in total. They followed the recommendations set out by each manufacturer, then monitored tag retention, collecting data for three years to see how well the tags were staying in.

The data for the multi-year farm and ranch trials is being analyzed and will be reported soon.

Above: A member of PAMI's staff measures a hole ripped through a cow's ear when one of the tags was pulled through. Below: A mechanical ear was developed to allow testing of how much force it takes to break apart the tags, and how the tags break.



New Equipment Purchases

In 2013-14, PAMI purchased large equipment through the Growing Innovation program. This program is funded by the governments of Canada and Manitoba under Growing Forward 2, a federal-provincial-territorial initiative.

PAMI's tractor and baler.

In total, $699,200 was spent on new equipment which will assist PAMI and our clients, and other agricultural research organizations as well.

Included in the purchase was a tractor, due to the fact that PAMI Manitoba Operations did not have one on site. Not only will the new tractor help PAMI with research projects, which often require the use of farm machinery, the tractor could be made available to other agricultural research organizations that have a need for one.

Also purchased was a low-speed data acquisition system, capable of recording temperatures, pressure, flow, and displacement. Self-powered, it can collect data for weeks, which is often required for PAMI projects. Owning one will do away with the high cost of renting one for project work, saving money for our clients. This enhanced capability will assist our clients in product evaluation and development.

Soil contact pressure measurement equipment was also purchased. This is important when doing research on tractors and flotation, such as comparing tracks to tires, which is an important topic in the agricultural community.

PAMI was also able to buy hydraulic simulation software. Using this software, staff will be able to design hydraulic systems, run simulations, and verify performances. This means that any hydraulic system design, such as for our own mobile densification system, can be done in-house. The software can also be used to simulate pumping hog manure long distances, or for monitoring irrigation and draining.

Also purchased was a field implement which allows PAMI to apply load in the field for tractor evaluations.

Last on the purchase list was a high density baler that allows higher compaction when biomass crops are collected, and will allow us to perform feasibility analyses.

PAMI's field loading device - deep tiller.

Industry and Mining

For PAMI, moving to provide service into industrial and mining sectors was a natural evolution, due to the deep and diverse engineering and design knowledge gained over nearly 40 years.

Small projects in the industrial and mining fields have led to larger ones, which have led to a new knowledge base and a once-again expanded client pool. Skill sets we develop in one area can be applied in another area. For instance, work with the defence industry allowed us to expand into electrical and hydraulic systems for industry, agriculture, and mining. PAMI's expertise in building electrical cables, which started with agricultural machinery, migrated to defence, and is now once again being applied to agricultural and mining industries.

PAMI's experience and approach to designing, building, and testing lends itself to a broad scope of applications and clients. We can research problems, design a solution, build a prototype, and test it, in-house or in conjunction with our clients.

As a full service engineering organization with a reputation for tackling difficult problems, PAMI has phenomenal tools to research, design, build, test, and document our findings for our clients. Our capabilities from the initial design process to prototype completion and testing are what have won us loyalty from companies in a variety of fields, including industry and mining. PAMI's physical equipment, processes, and know-how mean that we can accurately predict machinery performance to reduce design time, production downtime, and costs associated with the process, which makes us an invaluable partner for many organizations and businesses.

This year, PAMI conducted nearly 60 projects for industry and transportation clients, and defence and security agencies. We made further inroads into the mining industry as well, conducting underground testing for one of our clients to help improve safety for miners.

Vehicle Services

PAMI is the go-to place for the design, analysis, and testing of vehicles from all-terrain vehicles to large industrial equipment, and ambulances to motorhomes and buses. Our creative thinkers are often challenged by clients who require problems solved, or testing we have never done before, and we come up with solutions that get the job done.

We have helped clients solve mobility, suspension, and design issues. We have valuable expertise that can be applied where clients are using vehicles designed for a specific use (say public highway) in ways they were not intended or specifically designed to operate (off-road or underground).

Our capabilities include engineering and economic studies, selection of materials and manufacturing processes, as well as designing mechanical systems, fluid power systems, and electronics, controls and programming, just to mention a few. We also provide complete documentation, from drawings to installation instructions to manuals.

After the design comes building. With our in-house shop, we can offer complete prototype metal fabrication, including machining, welding, and laser or water-jet cutting, along with electrical cabling.

Then there are our testing services. PAMI is a National Laboratory armed with experienced staff with expertise in standards testing and state-of-the art, unique facilities. Because of our ISO 17025 accreditation, we can provide internationally-supported documentation of equipment we test, and we have earned the loyalty of many companies because of this ability.

Professional engineers oversee all testing, and produce reports recognized by standards testing bodies and government regulatory bodies across the country.

PAMI can help clients meet Transport Canada's National Safety Mark (NSM) Certification, requirements that are designed to ensure the continued safe operation of the increasingly diverse fleet of vehicles on the road today. We have been building an in-depth understanding of NSM regulations and their implications for manufacturers, so we can answer any questions regarding the regulations, and can help bring products into compliance with NSM regulations.

PAMI can test equipment and machinery to comply with standards produced by:

- the Society of Automotive Engineers (SAE)
- the American Society of Agricultural and Biological Engineers (ASABE)
- the American Society of Mechanical Engineers (ASME)
- Canadian Standards Association (CSA)
- Canadian General Standards Board (CGSB)
- Canadian Motor Vehicle Safety Standards (CMVSS)
- Federal Motor Vehicle Safety Standards (FMVSS)
- International Standards Organization (ISO)
- Occupational Health and Safety Act (OHSA) [U.S. and Canada]
- Organization for Economic Cooperation and Development (OECD)

Within the past year, PAMI has assisted companies with component design, vehicle mobility, centre of gravity testing, restraint strength certification, lighting tests, and cold-start testing, making use of the large environmental chamber at our Saskatchewan facility.

Once again, PAMI did extensive testing on ambulances and buses. Our engineers have conducted a wide array of tests on the safety systems of ambulances, primarily for private clients, for a number of years. We can do testing to meet the requirements of any jurisdiction – in total we can run over 40 tests on ambulance systems, from the wheelbase to the siren to ensure they comply with safety regulations — as well as compliance testing, which keeps our clients coming back.

Our ambulance certification services are a critical function for our clients. PAMI certificates are often required before our clients' customers will accept delivery.

Small and Medium Enterprises (SME) Innovation Initiative

The National Research Council Industrial Research Assistance Program has provided PAMI with funding to increase competitiveness and innovation capability of SME manufacturing companies.

The initiative is meant to build SME awareness of the technological opportunities to accelerate product commercialization, reduce risk, increase profitability, attract investment, contribute to the economy through wealth generation and job creation, and enhance market readiness.

Over the past year, PAMI has assisted 96 SMEs through private consultations and group sessions, such as a session entitled "Product Development Cycles" hosted by PAMI at the Crop Production Show in Saskatoon in January 2014.

The SMEs requesting PAMI's assistance can be divided into two groups — small businesses in need of guidance to make their ideas into a product they can commercialize, and larger companies that need help designing and testing a product for specific markets. PAMI has a unique ability to share technical experience with the SMEs, and has not only assisted the companies in building awareness, knowledge, and processes within their own systems, but have helped prepare their products for the market. That market readiness has involved design and testing, product development, market analysis, benchmarking, competitive business intelligence, and process development.

PAMI personnel were able to test and certify a riser system for Staging Canadell, a local company.

PAMI also assisted Staging Canadell, a local company that manufactures portable staging and music risers, with the testing of a new, higher riser system for a client in eastern Canada.

Eric von Doellen, the owner of the company, reported that they were able to secure a large contract for the riser system which was tested at PAMI, thanks to the help of PAMI staff.

The technical background of the PAMI staff members involved meant that they knew which tests to perform, and how to perform them in order to get Staging Canadell the certification necessary. PAMI provided an invaluable knowledge base to the client, in a time frame that allowed them to secure their sale, von Doellen indicated.

"The entire team that we worked with was amazing – efficient, knowledgeable and accommodating," he said.

"This is a very large project for us and we could not have done it without the help of PAMI, especially the turn-around time," von Doellen noted. "We would like to extend our sincere gratitude to the PAMI team. I cannot say enough about the quality of the test, how accommodating, knowledgeable, and professional the PAMI team was, and again how quickly this was put together for us."

CSA Technical Committee on Agricultural Machinery

Jim Wassermann, Vice President Saskatchewan Operations, is the Vice-Chair of the Canadian Standards Association (CSA) Technical Committee on Agricultural Machinery. The committee, which consists of manufacturers, researchers, regulators, and producers, maintains approximately 15 CSA standards, while also either adopting or endorsing about 30 applicable international standards that allow designers and engineers to develop new machines that meet national standards and international guidelines.

Primary issues discussed by the CSA Technical Committee, include:

- Update to tractor and trailer braking standards
- Spray drift and its assessment
- Machinery cab noise
- The misuse of slow-moving vehicle signs
- Incident investigation
- Machinery travelling on highways

PAMI's research program, which is intended to solve machinery-related issues for farmers, also includes services related to safety, with a special focus on engineering safety support for older farm machinery.

PAMI has partnered with CASA and other farm-safety associations like the Canadian Centre for Health and Safety in Agriculture (CCHSA) to conduct several projects to improve the safety of older farm machinery.

A number of publications resulting from those projects are available for download on the PAMI website at www.pami.ca.

Our Projects

In 2013-14, PAMI undertook over 170 projects in the areas of Agriculture, Energy, Industry, Transportation, and Defence, and Security.

The following list shows some of the general topics addressed by our research in the past year. It does not include confidential projects.

- Short Rotation Forage Legumes
- Evaluation of Canola Meal
- Continuation of Long Term Manure Study
- Continuation of Greenhouse Gas Study
- Improving Retention of RFID Tags for Cattle
- Research and Development Services for Small and Medium-sized Enterprises in Saskatchewan and Manitoba
- Design of Bench Scale Torrefaction Equipment
- Continued Operation of Solid State Digester Plant
- Large Scale Torrefaction Demonstration
- Biomass Plot Trials
- Biogas Utilization for Heat Production
- Solid State Digester Lid Upgrade
- Business Case Development for Solid State Digestion
- Utilization of Stockpiled Perennial Forages
- Cost Effective Heifer Development Systems
- Evaluation of Grazing Corn Varieties to Extend Grazing Season and Reduce Winter Feeding Costs in Western Canada
- Grain vs Grass: Economics Revisited
- BIXS 1.0 in Action on Saskatchewan Ranch
- Comparison of Different Herbicide Options for Absinthe
- Producer-Friendly Cow-Calf Cost-of-Production Tool
- Pellets for Pregnant Cows
- Beef Cattle Breeding Programs
- On-Farm Wind
- Long-term Manure Treatment Evaluation
- Cattail Harvesting
- Filter Evaluation
- Densification
- Fibre Flax Pulling
- Hog Fuel Cubing
- Optimization of Mobile Densification System
- Anaerobic Digestion Nutrient Profile

Our People

PAMI's employees were recognized both externally and internally for their hard work and dedication to industry, research, and our organization over the past year.

Dr. Bart Lardner, our senior research scientist at the Western Beef Development Centre (WBDC), received the Canadian Animal Industries Award in Extension and Public Service at the Canadian Society of Animal Science annual general meeting and conference in June, 2013. Lardner was selected for the award due to his ability to relate to beef and forage producers. His down-to-earth style connects with those on the farm, and his focus has always been to not only report research results, but to help producers apply knowledge gained by research to improve their own operations.

Dr. Bart Lardner of the Western Beef Development Centre.

Lardner has worked as a researcher in the agricultural industry for the past 16 years, and is passionate about the cow-calf industry in Canada. He strongly believes in providing extension to producers, and helping them resolve issues on their own ranches.

The impressive work of PAMI's own Derek Rude, Robert Cropper, and Les Hill was recognized by a client, who named the three as inventors on patents submitted for one of their novel inventions.

A poster created by Dr. Joy Agnew, Patricia Lung, and Carrie Gillis was recognized by the 21st European Biomass Conference and Exhibition in Copenhagen, Denmark in June of 2013.

The poster's content on PAMI's Solid State Anaerobic Digester and its style impressed the judges, and was chosen to receive the award in the Anaerobic Digestion for Biogas Production category.

Unfortunately, due to travel conflicts, PAMI could not be present to accept the award, and therefore had to forfeit it.

Long Service Awards

In the past year, 12 PAMI employees have been recognized for their long service to the organization.

Years of service awards were as follows:

- One 20-year award
- Five 15-year awards
- One 10- year award
- Five five-year awards

Employees from Saskatchewan Operations and Western Beef Development Centre were recognized for their long service at a banquet in 2014.

Manitoba Operations staff opted for go-carting as their employee celebration for both long service and the holidays.

David Gullacher, P.Eng., PAMI's president and CEO, was named an Honourary Life Member of the Saskatchewan Institute of Agrologists at their 2014 Adaptation Convention in Saskatoon. This honour is presented out of respect and in recognition of Saskatchewan achievements in and service to agriculture, bioresources, food, or the environment.

PAMI President and CEO Dave Gullacher (right) receiving his Honourary Life Member award from Shankar Das of the Saskatchewan Institute of Agrologists.

Financial Statements

Management Report

To the Members of the Legislative Assembly of Saskatchewan

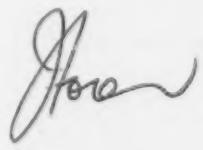
Year Ended March 31, 2014

The accompanying financial statements are the responsibility of the management of the Prairie Agricultural Machinery Institute. They have been prepared in accordance with Canadian public sector accounting standards, using management's best estimates and judgments, where appropriate.

Management is responsible for the reliability and integrity of the financial statements, the notes to the financial statements, and other financial information contained in this report. Management is also responsible for maintaining a system of internal controls, policies and procedures designed to provide reasonable assurance that assets are safeguarded and the accounting systems provide accurate and reliable financial information.

The Board of Directors is responsible for ensuring that management's responsibilities are properly discharged, to review and approve the financial statements. The Provincial Auditor of Saskatchewan has audited PAMI's financial statements in accordance with Canadian generally accepted auditing standards and her report follows.

David Gullacher
President and CEO



Joanne Forer
V P. Finance and Administration

PROVINCIAL AUDITOR
of Saskatchewan

INDEPENDENT AUDITOR'S REPORT

To: The Members of the Legislative Assembly of Saskatchewan

I have audited the accompanying financial statements of the Prairie Agricultural Machinery Institute, which comprise the statement of financial position as at March 31, 2014, and the statement of operations and accumulated surplus, statement of remeasurement gains and losses, statement of changes in net financial assets and statement of cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards for Treasury Board's approval, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Opinion

In my opinion, the financial statements present fairly, in all material respects, the financial position of the Prairie Agricultural Machinery Institute as at March 31, 2014 and the results of its operations, its remeasurement gains and losses, changed in its net financial assets, and its cash flows for the year then ended in accordance with Canadian public sector accounting standards

Judy Ferguson

Regina, Saskatchewan
July 9, 2014

Judy Ferguson, FCA
Acting Provincial Auditor

Statement 1
Statement of Financial Position
As at March 31

	2014	2013
Financial Assets		
Cash	$ 513,766	$ 435,465
Due from General Revenue Fund (Note 3)	1,966,783	2,759,883
Accounts receivable (Note 4)	3,237,997	4,045,257
	5,718,546	**7,240,605**
Liabilities		
Accounts payable and accrued liabilities (Note 5)	780,733	1,806,016
Unearned revenue	560,718	614,716
	1,341,451	**2,420,732**
Net Financial Assets (Statement 4)	**4,377,095**	**4,819,873**
Non-Financial Assets		
Tangible capital assets (Schedule 1)	4,857,883	4,503,301
Prepaid expenses	267,772	242,192
Breeding herd (Note 6)	224,799	264,427
Inventory held for consumption (Note 7)	243,889	325,177
	5,594,343	**5,335,097**
Accumulated Surplus (Note 8)		
Accumulated operating surplus (Statement 2)	9,970,985	10,153,852
Accumulated remeasurement gains (Statement 3)	453	1,118
	9,971,438	10,154,970
	$ 9,971,438	**$ 10,154,970**

Contractual obligations and contingencies (Note 13)

(See accompanying notes to the financial statements.)

Statement 2
Statement of Operations and Accumulated Surplus
For year ended March 31

	Budget (Note 12)	2014	2013
Revenue			
Provincial Transfers:			
Government of Saskatchewan			
Ministry of Agriculture			
- operating	$ 995,000	$ 995,000	$ 995,000
Government of Manitoba			
Department of Agriculture, Food and Rural Development			
- operating	260,000	259,682	259,682
- Growing Forward 2	-	16,644	-
	1,255,000	1,271,326	1,254,682
Fee for service	13,795,000	10,084,388	17,055,116
Other income	370,300	553,926	502,527
Interest income	7,000	34,334	39,262
Total revenues	**15,427,300**	**11,943,974**	**18,851,587**
Expenses			
Saskatchewan Operations	9,837,556	8,940,599	13,764,289
Western Beef Development Centre	1,887,334	1,808,884	1,666,460
Manitoba Operations	2,298,485	1,643,603	2,373,360
Corporate Services	402,114	416,311	99,728
Total expenses	**14,425,489**	**12,809,397**	**17,903,837**
Operating surplus (deficit) before capital grants	**1,001,811**	**(865,423)**	**947,750**
Capital grants from Department of Agriculture, Food and Rural Development	-	682,556	11,772
Operating surplus (deficit) for the year (Schedule 2)	$ 1,001,811	**(182,867)**	**959,522**
Accumulated operating surplus, beginning of year		10,153,852	9,194,330
Accumulated operating surplus, end of year (Statement 1)		$ 9,970,985	$ 10,153,852

(See accompanying notes to financial statements)

Statement 3
Statement of Remeasurement Gains and Losses
For the year ended March 31

	2014	2013
Accumulated remeasurement gains beginning of year	$ 1,118	$ 423
Unrealized gains attributable to foreign exchange	453	1,118
Amounts reclassified to the statement of operations	(1,118)	(423)
Net remeasurement gains (losses) for the year	(665)	695
Accumulated remeasurement gains end of year (Statement 1)	$ 453	$ 1,118

(See accompanying notes to the financial statements)

Statement 4
Statement of Change in Net Financial Assets
For the year ended March 31

	Budget (Note 12)	2014	2013
Operating surplus (deficit) for the year (Statement 2)	$ 1,001,811	$ (182,867)	$ 959,522
(Acquisition) of tangible capital assets	(1,026,250)	(775,900)	(517,678)
(Acquisition and transfer) of breeding herd	-	(55,350)	(117,238)
Amortization of tangible capital assets	-	406,659	377,926
Amortization of breeding herd	-	56,200	66,107
Proceeds of disposal of tangible capital assets	-	1,714	681
Proceeds of disposal of breeding herd	-	44,728	41,716
Net loss on the disposal of tangible capital assets	-	6,206	4,073
Net loss on write-offs of tangible capital assets	-	6,739	3,107
Net (gain) loss on the disposal of breeding herd	5,000	(5,950)	(4,638)
Net (acquisition) of tangible capital assets and breeding herd	(1,021,250)	(314,954)	(145,944)
(Acquisition) of prepaid expense	-	(25,580)	(1,607)
Use (acquisiton) of inventory	-	81,288	(108,901)
Net (acquisition) consumption of other non-financial assets	-	55,708	(110,508)
Net remeasurement gains for the year (Statement 3)		(665)	695
Increase (decrease) in Net Financial Assets		(442,778)	703,765
Net Financial Assets, beginning of year		4,819,873	4,116,108
Net Financial Assets, end of year		$ 4,377,095	$ 4,819,873

(See accompanying notes to financial statements)

Statement 5
Statement of Cash Flows
For the year ended March 31

	2014	2013
Cash flows from (used in) operating activities:		
Receipts from customers and others	$ 11,377,246	$ 16,731,058
Transfers from Government of Saskatchewan	995,000	995,000
Transfers from Government of Manitoba	276,326	259,682
Payments to suppliers and employees	(13,295,453)	(16,852,315)
Interest paid	-	(24)
Interest received	34,334	39,262
	(612,547)	1,172,663
Cash flows from (used in) capital activities:		
Purchase of tangible capital assets	(775,900)	(517,678)
Purchase and transfer of breeding herd	(55,350)	(117,238)
Proceeds from sale of tangible capital assets and breeding herd	46,442	42,397
	(784,808)	(592,519)
Cash flows from financing activities:		
Receipt of capital grants from Government of Manitoba	682,556	11,772
Increase (decrease) in cash position	(714,799)	591,916
Cash position, beginning of year	3,195,348	2,603,432
Cash position, end of year	$ 2,480,549	$ 3,195,348
Comprised of:		
Cash	$ 513,766	$ 435,465
Due from General Revenue Fund	1,966,783	2,759,883
	$ 2,480,549	$ 3,195,348

(See accompanying notes to the financial statements)

Notes to the Financial Statements
March 31, 2014

1. **Status of Institute**

The Prairie Agricultural Machinery Institute (Institute) is a body corporate operating under *The Prairie Agricultural Machinery Institute Act, 1999*. Its primary purpose is to perform tests and conduct research on machinery, equipment and technologies used in the agriculture, food and other industries. The Institute's testing facilities are located in Humboldt and Lanigan, Saskatchewan and Portage la Prairie, Manitoba.

On wind-up, any net assets will be divided between the Governments of Saskatchewan and Manitoba in proportion to their respective share in the Institute's assets equivalent to the percentage of funding provided to date by each province.

The Institute's objective when managing its capital structure, which consists of net assets, is to ensure adequate funding exists to support its operations and growth strategies. Capital is managed through grant funding and a $700,000 available line of credit. The Institute does not have any long-term debt.

The Institute relies on funding from the Governments of Saskatchewan and Manitoba and on one customer for continued fee for service revenue. This customer accounts for 55% (2013 - 54%) of its fee for service revenue and 31% (2013 – 62%) of accounts receivable.

2. **Significant accounting policies**

Pursuant to standards established by the Canadian public sector accounting board (PSAB), the Institute is classified as an 'other government organization'. These financial statements are prepared in accordance with Canadian public sector accounting standards. The significant accounting policies are as follows:

a) Financial assets

Financial assets are assets that could be used to discharge existing liabilities or finance future operations and are not for consumption in the normal course of operations. Valuation allowances are used where considered necessary to reduce the amounts reported for financial assets to their net realizable value.

Cash consists of cash on hand, balances with financial institutions, and Due from General Revenue Fund.

Accounts receivable consist of receivables from customers (trade accounts) and other receivables. Receivables are recorded at cost less an allowance for doubtful accounts.

b) Non-financial assets

Non-financial assets are assets held for consumption in the provision of services. These assets do not normally provide resources to discharge the liabilities of the Institute unless they are sold. Tangible capital assets and other non-financial assets are accounted for as assets by the Institute because they can be used to provide services in future periods. Tangible capital assets are recorded at cost less accumulated amortization. Self-constructed assets are recorded at cost, including labour and materials. Amortization is recorded using methods and rates intended to amortize the cost of assets over their estimated useful life.

	Method	Rate
Buildings	declining balance	5%
Equipment, furniture, and vehicles	declining balance	10%
Computer equipment	declining balance	30%
Leasehold improvements	straight line	10%
Computer software	straight line	33%

Prepaid expenses are prepaid amounts for goods or services which will provide economic benefits in one or more future periods.

The breeding herd is recorded at cost less accumulated amortization. This asset is being amortized at 20% declining balance.

Inventory of livestock and feed is recorded at the lower of cost and net realizable value. Livestock inventory cost is determined using the weighted average method and feed inventory cost is determined using the first-in, first-out method. Net realizable value is the estimated selling price in the ordinary course of business.

c) Financial instruments

The Institute's financial instruments include cash, Due from General Revenue Fund, accounts receivable, accounts payable and accrued liabilities, and unearned revenue. These instruments are recorded at cost or amortized cost. The carrying amount of these instruments approximates fair value due to their immediate or short-term maturity. Except as otherwise disclosed the Institute is not exposed to significant credit, currency, interest or liquidity risk arising from these financial instruments that may affect the amount, timing and certainty of future cash flows.

d) Government transfers

Government transfers are the transfer of assets from government agencies and are not the result of any exchange transactions, and there is no expectation to repay the amounts in the future or a financial return. Government transfers are recognized in the fiscal year in which events giving rise to the transfer occur, providing the transfer is authorized, any eligibility criteria have been met and reasonable estimates of the amounts can be made.

e) Revenue recognition

The Institute's operations are funded by the Government of Saskatchewan and the Government of Manitoba according to an agreement between the two provinces. Under Order in Council 1800/79, the Institute is not required to return the unused portion of the provincial transfers. The Institute recognizes provincial transfers when the transfer is authorized and eligibility criteria have been met by the Institute.

The Institute recognizes fee for service revenue when the related services are provided. It recognizes fee for service on contracts using the percentage of completion method. It records monies received prior to providing services as unearned revenue.

f) Basis of segmentation

The Institute has adopted the Canadian public sector accounting standards requiring financial information to be provided on a segmented basis. The Institute has been segmented by accountability center. Revenues that are directly related to the costs of the segment have been attributed to each segment.
The segments are as follows:

- **Corporate Services** provides for the administration of the Institute.

- **Saskatchewan Operations** is an applied research, design, development and testing segment. It serves the agricultural, industrial, transportation, military and other market sectors.

- **Manitoba Operations** is an applied research, design, development and testing segment. It serves the agricultural, industrial, transportation, military and other market sectors.

- **Western Beef Development Centre (WBDC)** applies and transfers beef research to improve profitability of the cow/calf sector of the beef industry.

g) Foreign currency translation

Monetary and non-monetary assets and liabilities prior to settlement that are denominated in foreign currencies are translated into Canadian dollars on the balance sheet date at the exchange rate in effect for that date and are recorded in the statement of remeasurement gains and losses. In the period of settlement, the cumulative amount of the remeasurement gains and losses are reversed in the statement of remeasurement gains and losses and an exchange gain or loss is recognized in the Statement of Operations. Revenue and expense transactions are translated at the approximate exchange rate in effect for that date and are included in the determination of net income for the year.

h) Measurement uncertainty

The preparation of financial statements in conformity with Canadian public sector accounting standards requires management to make estimates and assumptions that affect the reported amount of assets and liabilities and disclosure of contingent liabilities at the date of the financial statements, and the reported amounts of revenue and expenses during the period.

Accounts receivable are stated after evaluation as to their collectability and an appropriate allowance for doubtful accounts is provided where considered necessary. Accounts receivable includes fee for service revenue on contracts based on an estimate of the percentage of completion at the time of measurement. The measurement of materials and supplies are based on estimates of volume and quality. Amortization is based on the estimated useful lives of tangible capital assets. These estimates and assumptions are reviewed periodically and, as adjustments become necessary they are reported in earnings in the periods in which they become known.

The degree of uncertainty associated with the measurement of estimated amounts recognized in the financial statements is not material.

3. Due from General Revenue Fund

Due from General Revenue Fund is money held in a bank account included in the Government of Saskatchewan's Consolidated Offset Bank Concentration arrangement. The Institute receives interest on a quarterly basis from the General Revenue Fund calculated using the Government of Saskatchewan's thirty-day borrowing rate and the Institute's average daily bank account balance. For 2014, the average interest rate was 1.02% (2013 – 1.09%).

4. Accounts receivable

	2014	2013
Trade accounts receivable	$3,222,177	$3,994,879
Other	37,415	71,973
Allowance for doubtful accounts	(21,595)	(21,595)
Accounts receivable	$3,237,997	$4,045,257

5. Accounts payable and accrued liabilities

	2014	2013
Trade accounts payable	$495,107	$920,327
Wages and other personnel costs	239,861	824,228
Other	45,705	61,461
Accounts payable and accrued liabilities	$780,733	$1,806,016

6. Breeding herd

Cost	2014	2013
Opening balance	$570,506	$546,023
Additions and transfers	55,350	117,238
Disposals	(94,095)	(92,755)
Closing Balance	$531,761	$570,506
Accumulated Amortization		
Opening balance	$306,079	$295,650
Amortization	56,200	66,107
Disposals	(55,317)	(55,678)
Closing Balance	306,962	306,079
Net Book Value	$224,799	$264,427

The breeding herd consists of cows that are used for beef research in the operations of the Western Beef Development Centre.

7. Inventory held for consumption

	2014	2013
Livestock	$160,945	$268,879
Feed	82,944	56,298
Total	$243,889	$325,177

Inventory consumed (recovered) in 2014 was $302,466 and in 2013 was $(19,998).

8. Accumulated Surplus

Accumulated surplus represents the net financial assets and non-financial assets of the Institute.

Accumulated surplus is comprised of the following two amounts:

- Accumulated operating surplus from operations, which represents the accumulated balance of net surplus arising from operations of the Institute and allocations as detailed in the table below.

- Accumulated remeasurement gains and losses, which represents the unrealized gains and losses associated with foreign exchange.

Certain amounts of the accumulated operating surplus, as approved by the board, have been designated for specific future purposes. These internally restricted amounts are included in the accumulated operating surplus presented in the Statement of Financial Position.

Accumulated operating surplus from operations is as follows:

	2013	Additions during the year	Reductions during the year	2014
Internally Restricted Surplus:				
Bio-energy and processing	$2,133,895	$ 21,029	$(331,232)	$1,823,692
Government funded capital	1,836,879	682,556	(232,883)	2,286,552
	3,970,774	**703,585**	**(564,115)**	**4,110,244**
Unrestricted Surplus	**6,183,078**	**-**	**(322,337)**	**5,860,741**
Accumulated Operating Surplus	**$10,153,852**	**$703,585**	**$(886,452)**	**$9,970,985**

9. Related party transactions

This financial statement includes transactions with related parties. The Institute is related to all Saskatchewan Crown agencies such as ministries, corporations, boards and commissions under the common control of the Government of Saskatchewan. The Institute is also related to all Manitoba Crown agencies because of the Government of Manitoba's participation in the operations of the Institute. In addition, the Institute is related to non-Crown enterprises that the Government of Saskatchewan or the Government of Manitoba jointly controls or significantly influences.

Routine operating transactions with related parties are recorded at the agreed upon rates and are settled on normal trade terms. Those transactions and amounts outstanding at year-end are as follows:

	2014	2013
Financial statements category		
Fee for service revenue	$1,158,221	$1,802,651
Other operating expenses	909,604	1,096,872
Accounts receivable	1,231,816	466,854
Accounts payable and accrued liabilities	116,849	216,164
Unearned revenue	487,454	261,501

In addition, the Institute pays Saskatchewan and Manitoba provincial sales tax on its taxable purchases made in those provinces. Taxes paid are recorded as part of the cost of those purchases.

Other transactions with related parties and amounts due to/from them are described separately in the financial statements and the notes thereto.

10. Pensions

The Institute's employees participate in the Saskatchewan Public Employees Pension Plan, a multi-employer defined contribution pension plan. Pension benefits are based on accumulated contributions and investment earnings. The Institute's responsibility is limited to paying the required employer contributions of 6% of regular salaries. Salaries and benefits include contributions of $338,676 (2013 - $341,020) which are funded from current operations.

11. Financial risk management

Risks have been identified and the Institute ensures that management monitors and controls them. The significant financial risks to which the Institute is exposed are:

Credit risk

Credit risk is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation. The Institute is exposed to credit risk on the accounts receivable from its customers. In order to reduce its credit risk, the Institute applies sound credit practices. The Institute incurred insignificant bad debt expense during the past five years.

Market risk

Market risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market price. Market risk is comprised of currency risk and interest rate risk.

Currency risk

Currency risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in foreign exchange rates. The Institute is exposed to currency risk on its cash, accounts receivable, and accounts payable. The Institute does not use any derivative financial instruments to alter the effects of this risk.

The Institute enters into transactions denominated in United States currency for which the related revenues, expenses, accounts receivable and accounts payable balances are subject to exchange rate fluctuations. As at March 31, 2014 the following items are denominated in United States currency ($ CAD converted at $1 USD - 1.1053 CAD (2013 – 1.0167)):

	2014	2013
Cash	$44,504	$(3,305)
Accounts receivable	-	-
Accounts payable	39,825	206,712

Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. The Institute's exposure to interest rate risk is limited to the line of credit and trade payables. The interest rate on this debt is variable; therefore, the Institute may face increasing interest costs in an increasing interest rate market.

Liquidity risk

Liquidity risk is the risk that an entity will encounter difficulty in meeting obligations associated with financial liabilities. The Institute's exposure to liquidity risk is dependent on the receipt of funds from its operations, external borrowings and other related sources. Funds from these sources are primarily used to finance working capital and capital expenditure requirements, and are considered adequate to meet the Institute's financial obligations.

12. Budget

The budget for 2013/2014 was approved by the Board on April 30, 2013. The budget figures are presented for comparison purposes.

13. Contractual obligations and contingencies

The Institute has committed to provide future services to several research and development projects. At March 31, 2014, the value of these services totals $ 170,100 (2013 - $244,670).

Lease terms on vehicles, equipment and land range from 3 to 7 years. In 2014, these lease costs totalled $79,021 (2013 - $74,982). The Institute is required to make the following minimum lease payments on these leases:

2015	$ 37,086
2016	9,991
2017	7,578
2018	1,092
2019	-

Under contract with Western Canada Testing Inc. (WESTEST), the Institute manages and operates WESTEST under the direction of WESTEST's Board of Directors for a certain percentage of the service fees from WESTEST clients. During the year, the Institute earned fee for service revenue of $341,061 (2013 - $467,841) from WESTEST. At year-end, accounts receivable includes $385,287 (2013 - $171,026) due from WESTEST.

At year-end two actions were outstanding against the Institute. The ultimate outcomes are not yet determinable and accordingly, no liability has been recorded in the financial statements. One action is litigation by the Institute against a client for non-payment of amounts owed. The second action is litigation against the Institute relating to research analysis, reporting and comments made publicly by the Institute.

14. Comparative Figures

Certain prior year balances have been reclassified to conform to the current year's financial statement presentation.

Schedule 1
Tangible Capital Assets
As at March 31

	Asset Cost					Accumulated Amortization					Net Book Value 2014	Net Book Value 2013
	Opening Balance	Additions	Disposals	Write-downs	Closing Balance	Opening Balance	Amortization	Disposals	Write-downs	Closing Balance		
Land and Improvements	$279,841	$ -	$ -	$ -	$279,841	$ -	$ -	$ -	$ -	$ -	$279,841	$279,841
Buildings	5,294,081	84,699	-	-	5,378,780	2,962,480	120,815	-	-	3,083,295	2,295,485	2,331,601
Equipment and Furniture	3,305,854	664,841	-	(1,097)	3,969,598	1,804,818	216,523	-	(449)	2,020,892	1,948,706	1,501,036
Vehicles	554,500	13,887	-	-	568,387	361,948	20,644	-	-	382,592	185,795	192,552
Computer Equipment	508,200	-	(30,689)	(67,587)	409,924	427,526	19,999	(22,769)	(61,496)	363,260	46,664	80,674
Leasehold Improvements	171,246	-	-	-	171,246	61,276	17,124	-	-	78,400	92,846	109,970
Computer Software	59,408	12,473	-	-	71,881	51,781	11,554	-	-	63,335	8,546	7,627
Total	$10,173,130	$775,900	$(30,689)	$(68,684)	$10,849,657	$5,669,829	$406,659	$(22,769)	$(61,945)	$5,991,774	$4,857,883	$4,503,301

Schedule 2
Segment Disclosure
For the year ended March 31

	Corporate Services		Saskatchewan		Manitoba		Western Beef Development Centre		Total	
	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013
Revenue										
Provincial Transfers:										
Government of Saskatchewan										
Ministry of Agriculture										
- operating	$ 320,000	$ 320,000	$ 310,000	$ 310,000	$ -	$ -	$ 365,000	$ 365,000	$ 995,000	$ 995,000
Government of Manitoba										
Department of Agriculture,Food and Rural Development										
- operating	30,000	30,000	-	-	229,682	229,682	-	-	259,682	259,682
- Growing Forward 2	-	-	-	-	16,644	-	-	-	16,644	
	350,000	350,000	310,000	310,000	246,326	229,682	365,000	365,000	1,271,326	1,254,682
Fee for service	-	-	8,235,997	13,682,910	1,041,261	2,327,016	807,130	1,045,170	10,084,388	17,055,116
Interest income	12,501	13,826	21,254	25,436	-	-	579	-	34,334	39,262
Other income	11	112	76,666	347,046	15,230	20,311	462,019	135,058	553,926	502,527
Total Revenues	362,512	363,938	8,643,917	14,365,412	1,302,817	2,577,009	1,634,728	1,545,228	11,943,974	18,851,587
Expenses										
Personnel	774,017	820,042	4,685,840	5,056,280	953,791	1,248,702	744,549	815,455	7,158,197	7,940,479
Fee for service direct costs	-	-	2,310,457	6,380,305	192,621	597,810	376,377	416,424	2,879,455	7,394,539
Administration	107,885	99,222	774,189	742,936	218,352	245,814	260,463	(11,278)	1,360,889	1,076,694
Operating	45,186	33,563	429,383	518,557	100,744	104,371	249,364	251,478	824,677	907,969
Administration fee (recovery)	(521,375)	(862,736)	427,054	692,883	53,520	117,594	40,801	52,259	-	-
Amortization	5,000	5,000	241,648	272,763	100,549	86,481	115,661	129,789	462,858	444,033
Lease - land and equipment	1,865	176	37,213	45,989	22,802	22,488	17,141	229	79,021	68,832
Exchange loss	133	71	16,312	47,396	484	-	42	2,118	16,971	49,585
Loss on disposal of assets	-	-	12,205	7,180	740	-	2,083	4,221	15,028	11,401
Honoraria	3,600	4,356	-	-	-	-	2,403	5,765	6,003	10,131
Bad debt	-	-	6,298	-	-	150	-	-	6,298	150
Interest expense	-	24	-	-	-	-	-	-	-	24
Total expenses	416,311	99,728	8,940,599	13,764,289	1,643,603	2,373,360	1,808,884	1,666,460	12,809,397	17,903,837
Surplus (deficit) before capital grants	(53,799)	264,210	(296,682)	601,123	(340,786)	203,649	(174,156)	(121,232)	(865,423)	947,750
Capital grants	-	-	-	-	682,556	11,772	-	-	682,556	11,772
Surplus (deficit) for the year	$ (53,799)	$ 264,210	$ (296,682)	$ 601,123	$ 341,770	$ 215,421	$ (174,156)	$ (121,232)	$ (182,867)	$ 959,522

PAMI Corporate Services
Box 1150, 2215 8th Avenue
Humboldt, SK S0K 2A0
P: (306)682-2555, 1-800-567-PAMI
F: (306) 682-5080
pami@sasktel.net

PAMI Saskatchewan
P: (306) 682-5033
F: (306) 682-5080

PAMI Manitoba
Box 1060, 390 River Road
Portage la Prairie
P: (204) 239-5445
F: (204) 239-7124
portage@pami.ca

WBDC Main Office
Box 1150, 2215 8th Avenue
Humboldt, SK S0K 2A0
P: (306) 682-3139
F: (306) 682-5080
info.wbdc@pami.ca

WBDC Research Ranch
Box 700
Lanigan, SK S0K 2M0
P: (306) 365-3366
F: (306) 365-3374
humboldt@pami.ca

www.pami.ca
www.wbdc.ca
www.westest.ca